

Original Research

Relation Between 10A', 10B' Markers And Lateral Segment Length In Complete Unilateral Cleft Lip

Shahin Abdollahi Fakhim¹, Nikzad Shahidi^{2*}, Mohammad Azarmi³

1. Associate Professor of Otorhinolaryngology, Department of Head and Neck Surgery, Faculty of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran.
2. Associate Professor of Otorhinolaryngology, Department of Head and Neck Surgery, Faculty of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran.
3. Otorhinolaryngologist, Department of Head and Neck Surgery, Faculty of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran.

***Corresponding Author: Nikzad Shahidi**, Associate Professor of Otorhinolaryngology, Department of Head and Neck Surgery, Faculty of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran. Email: nikzadsh@yahoo.com, Orcid: 0000-0002-0759-5452.

Abstract:

Introduction: The characteristics of the cleft lip in terms of size and, consequently, the determination of the severity of the pathology are necessary to judge the quality of the surgery; Therefore, we decided to analyze the standard lip measurements in patients with complete unilateral cleft lip and evaluate them at the end of the operation to find the relationship between the size of the lip and nasal variables.

Methods: This descriptive and prospective study was performed with the participation of 20 children aged 1.5 to 4 months who had complete unilateral cleft lip with nasal deformity during 2016-19 in Imam Reza Hospital (Tabriz-Iran). After the analysis, standard lip measurements were performed. Finally, the data were entered into SPSS23 software and analyzed by spearman correlation test, Independent Samples and Mann-Whitney.

Results: There is a strong correlation between the width of the alveolar cleft at the Anteroposterior plane with a difference of 5A and 5B. Also, there was a significant and strong correlation between the width of the alveolar cleft at the horizontal level with the difference of 5A and 5B, in other words, increasing the width of the alveolar cleft in the horizontal and anteroposterior planes, the difference between 5A and 5B also increases.

Conclusion: According to the results, there was a relation between 5B and 10 A' B'. So the amount of 5B decreases moderately, by increasing the amount of 10 A' B'.

Keywords: cleft lip, 10A', 10B', 10A'B', anthropometric, nasal width

Submitted: 14 November 2021, Revised: 22 February 2021, Accepted: 2 April 2021

Introduction

Cleft lip/ palate surgery has progressed over the past 30 years, and the real aim of surgery is to achieve normal and natural appearance or close to normal 1. To obtain excellent results, a coherent team with a long-term experience is needed. The most important step in treating patients with lip cleft is the initial treatment and nasal repairing and cleft lip is the standard treatment of many advanced countries 2,3 . Although nasal surgery is acceptable in the repair of the lips, but severe secondary deformity in the nose is commonly seen due to lack of experience. Due to the complexity of the primary and secondary surgical procedures of the cleft lip, only experienced and trained surgeons should perform these procedures. The association of experience with the results is shown by group studies and clinical standards 4,5.

Much attention should be paid to accurate following of patients and analysis of personalized results in order to improve results over time. Several surgical adjustments have been made over time that have altered the original surgical techniques and have improved the results for both symmetry and beauty, and reduced scars and improve balances 6,7. The severity of initial nasal deformity is related to the rate of displacement and abnormal maxillary segments of hypoplasia. The continuation of hypoplasia and displacement of specific jaw segments on the side of the smaller

segments (the same side of the cleft) leads to multiple degrees of maxillary contraction in patients with deformity of the cleft lip and nose. The subsequent development and final prognosis of the patient in terms of deformity depends on the dysmorphogenesis of the cleft and the choice of surgical technique and sequence of treatments 2,8.

Exclusive deformity analysis is important for surgical design. Anthropometric and formal measurements are useful for determining deformity and severity. At least the analysis of the length of the lateral lip, the medial segment of the lip, the horizontal length of the lips and the dimensions of the nasal holes should be obtained 9 . Considering the above mentioned points to judge the surgical quality of the patient with the cleft lip, cleft lip profile in terms of size and, consequently, the determination of the severity of the pathology, should be on hand. So it couldn't be the result of an incomplete unilateral cleft lip Compare with a patient with a very severe complete unilateral cleft lip. On the other hand, determining the severity of deformity and shortness of lip tissue deficiency at the vertical or horizontal surface, adjustment modalities are needed to help improve the outcome of the procedure 10 , 11.

According to researchers experience how much is the width of 10A' and 10B' are lower, in other words, the width of the nasal floor on cleft side including 10 A'B' is great, the

pathology or severity of the cleft is greater and the shortness of lip in the side of the cleft and in the non-cleft side is greater and it will need to adjustment techniques and even re-surgical procedures to achieve a symmetric lip 3,9. The probability of severe shortness of both vertical & horizontal length of the lip on the side of the cleft before surgery in very severe cases and decreasing horizontal length of the lip in cleft side even more will increase in extreme cases. Therefore, we were able to find out the relationship between the size of the lip and nose variables by analyzing standard anthropometric measurements in UCLP patients and evaluating the lip mesearment at the end of surgery and modulating surgical techniques 12,13. In none of the studies which are performed so far to assess the correction of deformity of the lip and nose after surgery, the relationship between lip variables has not been studied. Therefore, we decided to conduct the present study with the aim of Relation between 10A', 10B' and Lateral Segment Length in Complete Unilateral Cleft Lip.

Methods

In this descriptive and prospective study that was conducted from 2015/march/20 to 20/march/2018 in Imam Reza Hospital of Tabriz affiliated to Tabriz University of Medical Sciences with the participation of 20 children aged 1.5 to 4 months with complete unilateral cleft lip. During the mentioned period, we were able to identify 20 items by

numerical and purpose-based sampling method and entered all of them into the study by matching the inclusion and exclusion criteria.

Inclusion criteria included 1- patients after termination of newborn 2- Complete unilateral cleft of lip and palate 3- Cardiovascular health and excluding Criteria included 1-lesser than 28 days 2- Incomplete unilateral lip cleft 3- bilateral cleft lip 4- history of previous surgery 5- Congenital heart defects 6- Coagulation disorders 7- Infection 8- Down syndrome 9 – Hydrocephaly .

In this study, 20 patients, including 11 boys and 9 girls with complete unilateral cleft of lip and palate along with nasal deformity, were selected for surgery, and None of the patients underwent nasoalveolar molding due to lack of facilities. lip repair surgery, closure of nasolabial fistulae, correction of anterior deviation of septum and correction of nasal deformity was performed. After undergoing cardiopulmonary and renal evaluation, and all other anomalies, all patients were surgically treated by a surgeon as soon as they were ready for elective surgery and gaining at least 4.5 kg. In the beginning of surgery, vertical and horizontal variables were measured and recorded according to the Noordhoff's method. Based on treatment policy, all patients operated with rotation-advancement along with modification, the nasal floor was closed from incisive foramen of cleft side to the anterior nasal floor of the nose, using a

buccal flap and a cut of the lateral wall of nasal vestibulae and mucoperichondrial flap of medial side. Septal cartilage was released from the ANS in a non-cleft side and placed and fixed on the cleft side of the ANS. The rotation incision was made on the cleft side with the designing of c flap and backcut. In severe cases one of the modifications is spreading the rotation incision and backcut to the columella (Mohler modification). The vermillion unilimb Z flap in cleft side was designed in all patients. On the side of the cleft, the advancement flap cut was given and after the supraperiosteal premaxillary dissection were used to extend the non-cleft side. The extent of dissection is another modification for releasing tension. Severe shortness of lip in the vertical extent (11B is so short) at the end of the operation showed the possibility of asymmetric lip in the vertical dimension, other modification is The need for a Z flap of the skin (triangular flap) which is need most times. Sometimes when the lip is so much short in cleft side and the differences between 6 A and 6 B is less than 10 mm , it is possible to change the high point of cupid bow in cleft side to the lateral for increasing the vertical length and decreasing of 6B. Another modification is the extension of the advancement flap to the floor of the nose when it is possible, I mean that when the patient nasal floor width in the cleft side has enough skin (summation of 10A' and 10 B'with the help of C flap is more than 10AB),

it is possible to increase the length of the advancement flap. Sometimes it is possible to use the skin of nasal floor of the cleftside for lengthening of advancement flap in price of lessening of nasal floor width in cleft side and the excision of reasonable small skin from floor of noncleft side for giving symmetric nasal floors. Also the way of excision of medial border (denudation) of advancement flap is important for increasing the length of it. sometimes in very severe cases with the use of all modification techniques, it is impossible to give symmetric lip from the vertical viewpoint. In this circumstances not only the parents of the patients have to know, but also the surgeon must realise his or her experiences to overcome the challenging severe cases. The relationship between anthropometric points measurements and inability to give symmetric lip with using of all modification techniques help surgeons good criteria's. The checklist included questions such as age and gender, lip measurements, and surgical requirements.

In this study, we tried to observe all ethical issues in human research. These cases included obtaining an ethics code from the ethics committee of Tabriz University of Medical Sciences (IR.TBZMED.REC.1398.655), explaining the objectives of the study to patients' parents and obtaining informed and written consent from them, not receiving additional costs from patients and the option to participate in the study.

Statistical analysis

The data collected by the researcher were entered in the evaluation form of each person and entered into the statistical software SPSS23 by a statistical consultant (outside the research group). To compare data from spearman correlation statistical tests, Independent Samples Test and Mann-Whitney Test used. P value less than 0.05 was considered significant in all cases.

Results

The Mean \pm SD age of the patients was 140 ± 147.45 days means the children have an average age of about four months and a half, which is at most 18 months and at least one month. 9 children (45%) have approximately 2 months and only 2 children (10%) are older than one-year-old. Among the 20 children studied, 18 children (90%) needed unilimb z-plasty for lengthening of the non-cleft side. Creating symmetric lip in vertical dimension was possible in 16 children (80%) and in

horizontal dimension in all children (100%)(Table.1).

There is a strong correlation between the width of the alveolar cleft at the Anteroposterior plane with a difference of 5A and 5B. Also, there was a significant and strong correlation between the width of the alveolar cleft at the horizontal level with the difference of 5 A and 5 B, in other words, increasing the width of the alveolar cleft in the horizontal and anteroposterior planes, the difference between 5A and 5B also increases (Table 2) .

There was a significant difference between the mean of 5A and the mean of 5B of $1.73 \pm (-5.02)$. ($p < 0.001$) In other words, the average 5B is 5 units shorter than 5A. Between mean 11 A and 11 B have a significant difference of 3.79, indicating that 11B is 3.79 units shorter than 11A. There was a significant relationship between the use of the anterior nasal floor skin to extend the vertical length of the lips at the cleft side and difference of 5A and 5B. ($p = 0.646$, correlation=0.125)

Table 1: Requirements for surgery in patients participating in the study

Type of surgery	Yes (%)	No (%)
Need to use unilimb z plasty on the lip	18(90%)	2(10%)
Need to move the high point of The cupid bow to the side of the commissure on the cleft side	8(40%)	12(60%)
Need to use anterior nasal floor skin to extend the vertical length of the lip on the side of the cleft	16(80%)	3(15%)
Need to reduce the width of the nasal floor on the non-cleft side	3(15%)	17(85%)

Need to reduce the width of the nasal floor on the side of the cleft	5(25%)	15(75%)
Possibility to create a symmetric lip in the vertical dimension	16(80%)	4(20%)
Possibility to create a symmetric lip in the horizontal dimension	20(100%)	0

Table 2. Investigation of the correlations between differences 5A and 5B with differences 6A and 6B and differences 11A and 11B and width of alveolar fissure in horizontal and posterior plane

	Differences 11A and 11B	Differences 5A and 5B
Differences 5A and 5B	r=-0.381 P=0.097	1
Differences 6A and 6B	r=0.094 P=0.703	r=-0.198 P=0.416
The width of the alveolar cleft in the horizontal plane	r=0.229 P=0.31	r=-0.560 P=0.01
The width of the alveolar cleft at the posterior surface	r=0.218 P=0.356	r=-0.548 P=0.012

In children who needed to use the anterior part of nasal floor skin to extend the vertical length

of the lips at the cleft side, for 2 children, (12.5%) there was no possibility of a symmetric lip in the vertical dimension, and there was a significant relationship between the need to use the anterior part of nasal floor skin to lengthen the vertical lip was not seen on the side of the cleft and the possibility of creating a symmetrical lip in the vertical dimension ($p=0.422$, correlation=0.208).

In 20 children (100%) with the possibility of creating a symmetric lip in the horizontal dimension, the difference between 6 A and 6 B was less than 10, and the mean difference was 2.01 ± 1.27 . Despite the fact that all children have been reported $5A < 5B$, in 16 children (80%), it was necessary to use the anterior abdominal wall to extend the vertical length of the lips at the cleft.

Table 3: Evaluation of the results of creating and not creating symmetrical lips in patients participating in the study

	Possibility to create symmetrical lips in vertical dimension (N=16)	Impossibility of creating a symmetrical lip in the vertical dimension (N= 4)	p-value	t
Differences 5A and 5B	$1.84 \pm (-4.86)$	0.75 ± 6.00	0.075	1.916
Differences 10A' and 10B'	$0.75 \pm (-0.006)$	$0.27 \pm (-0.35)$	0.368	22.50
11A and 11A' difference	1.22 ± 3.66	0.95 ± 4.42	0.229	-1.346
The width of the alveolar cleft in the horizontal plane	3.20 ± 6.20	4.07 ± 9.37	0.079	13.50
The width of the alveolar cleft at the	2.46 ± 6.22	1.99 ± 10.20	0.016	-3.39

posterior surface			
<p>Among the 18 children (90%) who needed the use of unilimb z- plasty on the non-cleft lip, only 3 cases (16.7%) did not need to reduce the width of the flap on the non-cleft side, in 4 cases (22.2%) there was no possibility of a symmetric lip in the vertical dimension. Among 8 children (40%) who needed to move the high point of the cupid bow to the side of the commissure on the cleft side, only 2 (28.6%) needed the use of anterior part of nasal floor skin to lengthen the vertical length of the lip at the clef, 5 children (62.5%) did not need to reduce the width of the floor on the non-cleft side, 7 children (87.5%) did not need to reduce the width of the floor to the side of the cleft for 3 children (37.5%) .There was no possibility of a symmetric lip in the vertical dimension, and for the 8 children (100%), it was possible to create a symmetrical lip in the horizontal dimension. Among the 16 children (80%) who needed the use of anterior part of nasal floor skin to extend the vertical length of the lip in the cleft, 4 children (25%) needed to reduce the width of the nasal passage at the cleft, for 2 children (12.5%) There was no possibility of symmetric lip in the vertical dimension due to severity; in one child (6.3%), unilimb z- plasty was not required for the non cleft side of the lip, for 5 children (31.3%) it was necessary to transfer of the high point of the cupid bow toward the commissure on the cleft side. Among the 3 children (15%) who needed to reduce the</p>		<p>nasal floor width of the non-cleft side, every 3 children needed to use unilimb z -plasty in the lip skin for the non-cleft side and needed the transfer of the high point of the cupid bow to Commissure at the side of the cleft; for 2 children (66.7%) there was no possibility of a symmetric lip in the vertical dimension.</p> <p>Among the 5 children (25%) who needed to reduce the nasal floor width, 4 (80%) children needed unilimb z- plasty to use for the non-cleft side of the lips, 4 children (80%) needed The transfer of the high point of the cupid bow to the commissur at the side of the cleft; four children (80%) required the use of anterior part of nasal floor skin to lengthen the vertical length of the lips at the cleft side. In 16 children (80%), it was possible to create a symmetric lip in the vertical pattern and in 20 children (100%), it was possible to create a symmetrical lip in the horizontal dimension. Independent sample test was used to compare the mean of normal variables in two groups of children with the possibility of creating a symmetric lip in the vertical dimension and children who could not have a symmetric lip were used. For non-normal variables, Mann-Whitney test to compare the mean of variables in the two groups mentioned (Table 3).</p> <p>Discussion</p> <p>The aim of the present study was relation between 10A ' , 10B' and Lateral Segment Length in Complete Unilateral Cleft Lip. The results of our study showed that there was a</p>	

strong and significant correlation between 10A', 10B' and Lateral Segment Length in Complete Unilateral Cleft Lip. What was evident in our study was that the wide alveolar cleft and the rotation of the maxillary protuberance to the anterior and superior levels reduced the success of reconstruction of the symmetric lip and prevented the important role of advance flap in elongating the vertical length of the cleft side. On the other hand, due to the possibility that expand of the advance to the lateral side of the nasal floor causes the scars in bad forms. If we want to prevent the nose from shrinking in the side of the cleft, then the advance rotation in side of the gap will be less 14. The rotation advancement technique is one of the most commonly used techniques for repairing unilateral cleft lip. At least half of the surgeons who work with this method use modifications. Surgeons should therefore be familiar with modification methods 14,15.

Pre surgical orthopedics are commonly used prior to major repairs to improve results 16. Treatment of cleft lip requires a single understanding of the therapeutic dimensions for the uniformity of surgical outcomes 9. The treatment width includes multiple courses and treatment duration, include infancy until puberty. In a study by Xing He and colleagues, they examined cleft lip size, nasal width, and nasal floor width and basal length, a positive linear relationship between cleft palate and alar base length in patients

with complete unilateral cleft lip 17. Residual asymmetry following unilateral complete lips design 4 years after surgery becomes clearer the most common asymmetric location of the nasolabial area is facial growth asymmetrically in the direction that the upper lip filtrum is diverted to the scar tissue at the cleft side. Yao et al, In 2019, divided the severity of the cleft lip by 0.5 <severe and> 0.5 severe non-severe cleft lip and presented a poor or unacceptable prognosis for the absence of a symmetry in the vertical dimension of the lip (approximately 3mm<). Have been correlated, and concluded that a cleft width of <0.5 was associated with an unacceptable surgical prognosis 18. In this study, due to the lack of facilities and access of patients to primary orthopedics, including NAM, extensive soft tissue dissection is required to reduce the gap. In this study, we found that short lips (based on differences 11A, 11B, 5A and 5B) and alveolar cleft width (at both horizontal and anterior posterior surfaces) were associated with impossibility of symmetric lip formation in the vertical dimension. However, the alveolar cleft width had the greatest effect on antero posterior dimension (P-value = 0.016). Despite the general policy of Cut and go in patients with different severity of lip clefts and the need for surgeons to be aware of modification techniques to compensate for the ineffectiveness of the Rotation

Advancement technique in producing complete symmetry, in the event of malalignment of the alveolar segments and anterior rotation of the pre maxillary segment. The possibility of asymmetry in the vertical plane will be higher, and all modification methods to create a symmetric lip should be sought. Width of 10A' and 10 B' greatly helps to optimally close the nasal floor and modify the use of the anterior nasal floor skin. For those who have low 10A' and 10B' alone and may not be able to extend the high point of cupid bow transition to the commissure, the next step will be use of Z-flap skin. The impossibility of recording the long-term treatment results of patients and the lack of orthopedic and orthodontic facilities in our center and the limited number of centers providing incision surgery in our city were among the limitations of the present study. It is recommended to conduct a multicenter study with different methods and compare their results and follow up patients in long periods until puberty and compare the effects and therapeutic results of different techniques in the long run for further studies.

Conclusion

This study shows that with increasing the width of the lip at the side of the cleft (10A'B'), the vertical length of the lip is reduced at the side of the cleft, meaning that there is a significant relationship between the 10A'B' and the shortness of 5B, and the severity of the cleft width Length 5B will be

shorter, so in such cases it needs expert surgeon to use modification methods.

Acknowledgments

The authors would like to thank the Tabriz University of Medical Sciences, Iran

References:

1. Yamaguchi K, Lonc D, Lo L-J. Complications following orthognathic surgery for patients with cleft lip/palate: a systematic review. *Journal of the Formosan Medical Association*. 2016;115(4):269-77.
2. Hosseini HR, Kaklamanos EG, Athanasiou AE. Treatment outcomes of pre-surgical infant orthopedics in patients with non-syndromic cleft lip and/or palate: A systematic review and meta-analysis of randomized controlled trials. *PloS one*. 2017;12(7):e0181768.
3. Baghi S, Amareh M, Heirat R, Hajivandi A, Aalizadeh Y. Evaluation of relationship between the children's dental fear and cooperation during dental treatment with the parents' general health. *Iranian Journal of Pediatric Dentistry*. 2018;13(2):37-42.
4. Vyas T, Gupta P, Kumar S, Gupta R, Gupta T, Singh HP. Cleft of lip and palate: A review. *Journal of Family Medicine and Primary Care*. 2020;9(6):2621.

5. Tsichlaki A, O'Brien K, Johal A, Fleming P. A scoping review of outcomes related to orthodontic treatment measured in cleft lip and palate. *Orthodontics & craniofacial research*. 2017;20(2):55-64.
6. Raghavan U, Vijayadev V, Rao D, Ullas G. Postoperative management of cleft lip and palate surgery. *Facial Plastic Surgery*. 2018;34(06):605-11.
7. Awarun B, Blok J, Pauwels R, Politis C, Jacobs R. Three-dimensional imaging methods to quantify soft and hard tissues change after cleft-related treatment during growth in patients with cleft lip and/or cleft palate: a systematic review. *Dentomaxillofacial Radiology*. 2019;48(2):20180084.
8. Namdar P, Lal Alizadeh F, Etezadi T, Sadri L, Shiva A. Effect of Nasoalveolar Molding on Nasal Symmetry in Patients With Cleft Lip and Palate: A Systematic Review. *Journal of Pediatrics Review*. 2020;8(2):79-92.
9. Tse R, editor *Unilateral cleft lip: principles and practice of surgical management*. *Seminars in plastic surgery*; 2012: Thieme Medical Publishers.
10. Hussain SA, Nalabothu PK, Murthy J, Krishnan S. Clinical Profile of a Patient With Cleft Lip/Palate With Secondary Skeletal Deformities. *Journal of Craniofacial Surgery*. 2015;26(4):1423-7.
11. Sykes JM, Tasman A-J, Suárez GA. Cleft lip nose. *Clinics in plastic surgery*. 2016;43(1):223-35.
12. Eskandarian T, Baghi S, Alipoor A. Comparison of clinical success of applying a kind of fissure sealant on the lower permanent molar teeth in dry and wet conditions. *Journal of Dentistry*. 2015;16(3):162.
13. Rullo R, Carinci F, Mazzearella N, Festa VM, Farina A, Morano D, et al. Delaire's cheilorhinoplasty: unilateral cleft aesthetic outcome scored according to the EUROCLEFT guidelines. *International journal of pediatric otorhinolaryngology*. 2006;70(3):463-8.
14. Antonarakis GS, Thompson BD, Fisher DM. Preoperative cleft lip measurements and maxillary growth in patients with unilateral cleft lip and palate. *The Cleft Palate-Craniofacial Journal*. 2016;53(6):198-207.
15. Sitzman TJ, Girotto JA, Marcus JR. Current surgical practices in cleft care: unilateral cleft lip repair. *Plastic and reconstructive surgery*. 2008;121(5):261e-70e.
16. Shkoukani MA, Chen M, Vong A. Cleft lip—a comprehensive review. *Frontiers in pediatrics*. 2013;1:53.
17. He X, Shi B, Jiang S, Li S, Zheng Q, Yan W. 110 infants with unrepaired unilateral cleft lip: An anthropometric analysis of the lip and nasal deformities. *International journal of*

oral and maxillofacial surgery.
2010;39(9):847-52.

18. Yao CA, McCullough M, Auslander A,
Imahiyerobo TA, Vanderburg R, Magee III
WP. The smile index: Part 2. A simple,

prognostic severity scale for unilateral cleft lip.
Plastic and reconstructive surgery.
2019;143(4):790e-7e.