ORIGINAL PAPERS

Adv Clin Exp Med 2015, **24**, 3, 481–485
DOI: 10.17219/acem/28112

ISSN 1899–5276

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The Nasolabial Angle Among Patients with Total Cleft Lip and Palate

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A – research concept and design; **B** – collection and/or assembly of data; **C** – data analysis and interpretation; **D** – writing the article; **E** – critical revision of the article; **F** – final approval of article; **G** – other

Abstract

Background. Nasolabial angle is the angle that is measured between points *columella*, *subnasale* and *labiale superius*. The reference values vary from 90 to 120 degrees (the mean value is 109.8 degrees). In some disorders, nasolabial angle might change. This influences the facial profile. One of such deformities are clefts. The nasolabial angle might be decreased in cleft patients due to deformation of the nose and upper lip that might be caused by the reconstructive surgical procedures performed.
Objectives. The aim of the study was to compare the nasolabial angle between the groups of patients with total clefts of the lip, alveolar bone and palate and healthy individuals.
Material and Methods. The cephalometric X-rays of 118 patients with clefts (73 boys and 45 girls) and 101 healthy individuals (32 boys and 69 girls) were taken into account to measure nasolabial angle and compared.
Results. In patients with cleft deformities, the nasolabial angle values were smaller than in healthy individuals. Among the patients with clefts, the ones with a bilateral type of deformity are characterized by the highest mean values of nasolabial angle. The angle is smaller in groups of girls when compared to boys.
Conclusions. Nasolabial angle in patients with total clefts of lip, alveolar bone and palate is statistically smaller than in healthy individuals. This might be a result of either the deformation of the upper lip or (more probably) the nose. The orthodontic treatment should be individualized (**Adv Clin Exp Med 2015, 24, 3, 481–485**).

Key words: total cleft, nasolabial angle, cleft lip and palate.

Cleft deformities are the most common congenital disorders affecting the facial region. They are observed in 1:600–1:800 live births. Their real etiology is not known, but there is a crucial role of genetic and environmental factors that occur in the first trimester of pregnancy, when the palatal shelves do not combine with each other [1, 2].

The facial features of persons with orofacial clefts are characterized by asymmetry that refers to the nasolabial region mainly. Asymmetry in unilateral clefts is observed 6 times more frequently than in healthy patients and 3 times more frequently than in bilateral clefts. Due to the scarring at the affected side, soft tissues are positioned more anteriorly and are thicker than in healthy individuals. Beside that, deformity of the nasal rim, including flattening of the nostril of the affected side, is observed. This is a result of the presence of scarring [3, 4]. The asymmetry is also observed in hard tissues and refers mainly to the dentoalveolar region that is retruded and rotated backwards at the affected side [3–5]. The asymmetry in individuals with clefts was also observed in the mandible, where the chin is deviated to the cleft side [6]. The perception of facial features of such patients may lead to nervousness and result in temporomandibular joint disorders [7].

A harmonious profile is observed in 40% of cleft patients. Another of the most common observations is lengthening of the lower part of the face, being a sign of skeletal open bite [8]. Maxillary three-dimensional hypoplasia is the most common

feature in patients with clefts [2, 9]. It is observed both intra- and extraorally. Intraorally, most commonly, crossbites on the cleft side or in the incisor region are observed. The crossbite is most accented at the canine due to the collapse of the dental arch shape in that region [8, 10, 11].

According to Antoszewski et al. [12], the nasal length is shortened due to the surgical procedures performed and does not change much at puberty. This asymmetry may also result in a less attractive smile, which is very important in the perception by society [3, 4, 13].

The specific observations refer to the nasolabial angle that is defined as an angle between the line drawn through the *columella* and *subnasale* points and the line drawn from the *subnasale* to *labiale superius* points. The angle is found to be crucial in establishing facial profile aesthetics. The average value of the angle is 109.8° and is larger in women. Recent studies show that the average value of the nasolabial angle might in fact be smaller in the general population, though 90–120° is reported. This might result in a changing of perception of the visual "norms" of a facial profile [14, 15]. Reduction of the nasolabial angle in patients with clefts is observed and determines the characteristic profile of these individuals [16]

Aim

The aim of the study was to compare the nasolabial angle between the groups of patients with total clefts of the lip, alveolar bone and palate and healthy individuas.

Material and Methods

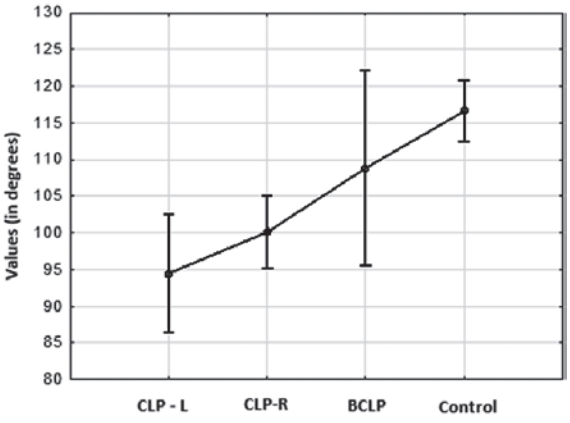
A lateral cephalogram analysis was done with use of the Ortobajt® v. 6.0 computer program. The landmarks *columella* (ctg), *subnasale* (Sn) and upper lip (UL) were marked on the cephalogram. The cephalograms were done in 118 patients with clefts (27 with the bilateral and 91 with the unilateral type of deformity). The control group was 101 healthy patients with orthodontic treatment needs. The group structure is presented in Table 1. Mean values were calculated. Statistical analysis was done with the use of the STATISTICA v. 10.0 computer program and combined variance analysis to compare the ranges (ANOVA) for $p \leq 0.05$.

Table 1. The structure of the examined groups

	Bilateral cleft	Left-sided cleft	Right-sided cleft	Control group
Women	12	27	6	69
Men	15	38	20	32
Total	27	65	26	101

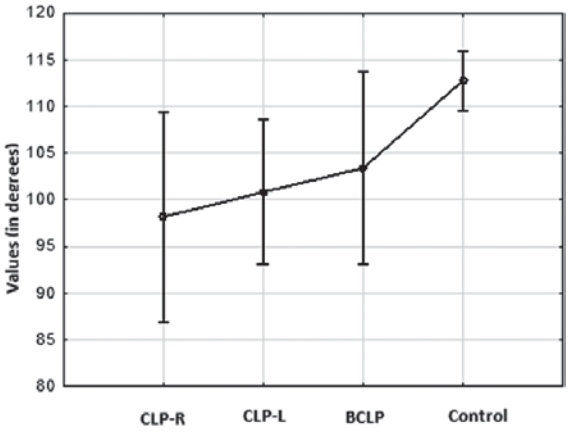
Table 2. Values of nasolabial angle in a group of boys

		Number of patients	Mean value	Min	Max	Standard deviation
Any cleft	age	73	13.13	7.10	20.00	2.61
	nasolabial angle	73	100.36	62.50	157.00	18.13
CLP-R	age	20	13.79	8.00	18.00	3.08
	nasolabial angle	20	94.48	62.50	128.60	17.11
CLP-L	age	38	12.85	8.00	20.00	2.36
	nasolabial angle	38	100.11	69.30	146.40	14.98
BCLP	age	15	12.97	7.10	16.50	2.54
	nasolabial angle	15	108.83	81.70	157.00	23.94
Control	age	32	13.85	10.00	18.00	2.14
	nasolabial angle	32	116.60	95.90	155.00	11.53



	CLP-L	BCLP	control
CLP-R	0.21	0.01	0.00
CLP-L		0.08	0.00
BCLP			0.12

Fig. 1. Dependency between nasolabial angle in a group of boys. CLP-R – patients with right-sided cleft; CLP-L – left-sided cleft; BCLP – bilateral cleft; control – healthy individuals. Statistically significant values were presented on the grey background



	CLP-L	BCLP	Control
CLP-R	0.44	0.02	0.52
CLP-L		0.02	0.01
BCLP			0.00

Fig. 2. Dependency between nasolabial angle in a group of girls. CLP-R – patients with right-sided cleft; CLP-L – left-sided cleft; BCLP – bilateral cleft; control – healthy individuals. Statistically significant values were presented on the grey background

Results

The measurements of the nasolabial angle in a group of boys are presented in Table 2. The nasolabial angle in the group of boys show a lot of differentiation, but its mean value is lower than the reference one (109.8°) only in the group of boys with right-sided cleft. Generally, the nasolabial angle values were lower in the group of patients with clefts than in the control group. The statistical analysis showed a lack of dependency of the nasolabial angle within the groups of boys with unilateral clefts (Fig. 1). The highest statistically significant difference was observed between the groups of boys with unilateral cleft and healthy individuals. There was no statistically significant difference between the groups of patients with bilateral clefts and healthy individuals.

Table 3. Values of nasolabial angle in a group of girls

		Number of patients	Mean value	Min	Max	Standard deviation
Any cleft	age	45	13.60	10.00	20.00	2.56
	nasolabial angle	45	101.14	57.80	142.40	17.51
CLP-R	age	6	12.40	10.00	16.00	2.35
	nasolabial angle	6	98.17	78.10	109.30	10.72
CLP-L	age	27	13.83	10.00	20.00	2.69
	nasolabial angle	27	100.81	57.80	142.40	19.52
BCLP	age	12	13.68	10.90	17.00	2.37
	nasolabial angle	12	103.38	70.50	124.90	16.20
Control	age	69	13.68	7.90	20.00	2.50
	nasolabial angle	69	112.77	74.40	139.80	13.17

The mean values of nasolabial angle in the group of girls are presented in Table 3 and Fig. 2. As in the group of boys, the girls also presented lower values of nasolabial angle than healthy individuals. The statistically significant values were observed in the group of girls with bilateral cleft when compared to any other examined group. The difference was also observed between the groups of girls with the left-sided type of cleft in comparison to healthy individuals.

Discussion

In the performed analysis, patients with clefts present lower values of nasolabial angle when compared to healthy individuals. The highest difference was observed between patients with unilateral clefts when compared to healthy individuals. No dependency was found between patients with bilateral cleft and the control group. Lower values of nasolabial angle in a group of patients with clefts are reported in literature and might be a result of nasal deformations – its flattening and its curvature to the cleft side. These deformities are accompanied by a shift of the point *columella* down, closer to the lips [16].

The nasolabial angle in the control group does not differ much from the reference angle (109.8°) and lies between the 90–120° reference values, but is smaller in girls, which is a different result from the values reported in the literature [14, 15]. The angle in patients with clefts is sharper, but still lies within the reference values of 90–120°. Our own observations also show that the angle values are smaller in girls than in boys.

The lack of difference between patients with bilateral cleft and healthy individuals might be caused by a larger deformity and retraction of the upper lip due to the reconstructive surgery procedures or retrusion of upper incisors and flattening of the subnasal region. Other studies show a flattening of maxillary convexity resulting in smaller values of SNA angle [17]. Also, retrusion of the upper incisors in cleft patients has been confirmed by other researchers. The intercanine region in the maxillary arch shows great differentiation in posture in patients with bilateral clefts, which may also result in more differentiation in nasolabial angle values [18, 19]. Orthodontic treatment should be individualized, as the smaller value of nasolabial angle might suggest that tooth extractions in the upper arch might be required, though patients with clefts show different malocclusions than healthy individuals (predominantly class III malocclusions and crossbites rather than class II malocclusions) [20, 21].

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Conflict of interest: None declared

Received: 22.01.2014
Revised: 28.05.2014
Accepted: 21.07.2014