ORIGINAL ARTICLE

IMPACT OF MALOCCLUSION OF CLASS II$_1$ ACCORDING TO ANGLE'S CLASSIFICATION METHOD ON FACIAL ESTHETICS

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ABSTRACT

The aim: There is no information on the esthetic features of the face, which are typical of the patients with late mixed occlusion with maxillodental anomalies of Angle's class II1 depending on the types of mandible growth in domestic and foreign literature. To study the esthetic peculiarities in the face profile, which are typical of the patients aged 10-13 with maxillodental anomalies of Angle's class II1 with different types of mandible growth.

Materials and methods: 55 patients aged 10-13 with maxillodental anomalies of Angle's class II1 were examined. Teenagers were divided into five groups depending on the type of mandible growth. 82 photostatic images in profile were analyzed. Soft tissue analysis was performed using the Viasis method.

Results: Face profile was studied based on the following indicators: convexity angle of the face profile Viazis (<V), profile angle by Schwarz (<T), the angle of the face profile shape (<gl-UL -pg), Th-me / NoV angle, nasolabial angle, labial angle (<L), mentolabial angle.

Conclusions: Photometric study in 55 patients aged 10-13 with maxillodental anomalies of Angle's class I and analysis of the results depending on the types of mandible growth prove the presence of a retrogenic type of the lower third of the face, convex shape of the profile, the development of posterior bite of varying severity. All patients were reported to have changes in the indicators of the lips position and non-harmonious development of their faces. The greatest esthetic changes were reported in the group of patients with a component of horizontal type of mandible growth.

KEY WORDS: Malocclusion, mandible, growth, photometry, dental occlusion

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INTRODUCTION

The demand among the patients with dentofacial anomalies for positive changes in facial esthetics with orthodontic intervention has been growing recently. The steady tendency to shift the priorities of the diagnostic assessment of solid skeletal tissues [1, 2, 3] to the evaluation of soft tissues of the face profile is related to the development of technologies such as photometry, which allow to meet this demand [4, 5, 6]. The type of facial skeleton growth plays an important role in changing the face profile and in achieving its harmony [7].

There is no information on the esthetic features of the face, which are typical of the patients with late mixed occlusion with maxillodental anomalies of Angle's class II$_1$ depending on the types of mandible growth in domestic and foreign literature.

THE AIM

To study the esthetic changes in the face profile, which are typical of the patients aged 10-13 with maxillodental anomalies of Angle's class II$_1$ with different types of mandible growth.

MATERIALS AND METHODS

55 patients aged 10-13 with maxillodental anomalies of Angle's class II$_1$ were examined. Teenagers were divided into five groups depending on the type of mandible growth, which was determined by orthopantomograms when studying the magnitude of mandibular angles [8]. Group I included 21 patients with neutral type of mandibular growth, group II consisted of 11 adolescents with vertical type of growth, group III – 9 patients with horizontal type of growth, group IV – 9 children with combined (neutral and vertical) type of growth, group V included 5 children with combined (neutral and horizontal) type of mandible growth. The control group consisted of 27 patients of the same age with abnormal position of individual teeth (Angle's class I).

Face photographing in lateral projection was performed under identical conditions from the distance of 150 cm. 82 photostatic images in profile were analyzed. Soft tissue analysis was performed using the Viasis method [9]. 574 angular parameters have been determined.

The convexity angle of the face profile Viazis (<V), nasolabial angle, labial angle (<L), mentolabial angle, profile angle by Schwarz (<T), the angle of the face profile shape

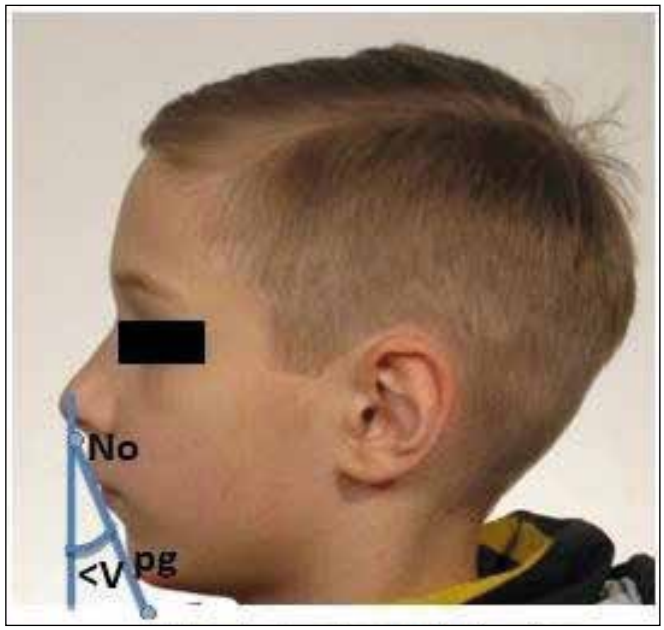

Fig. 1. Angle V (Viazis)

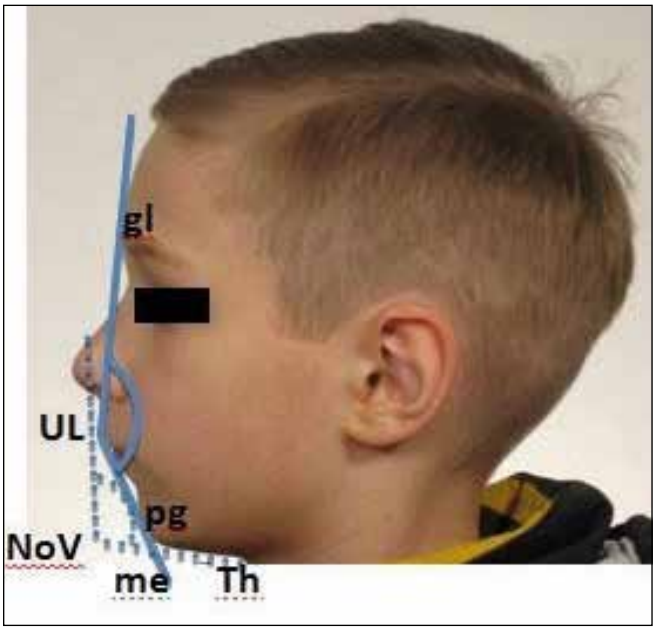

Fig. 2. Angle gl-Ul-pg (▬)
Angle Th-me/NoV (-----)

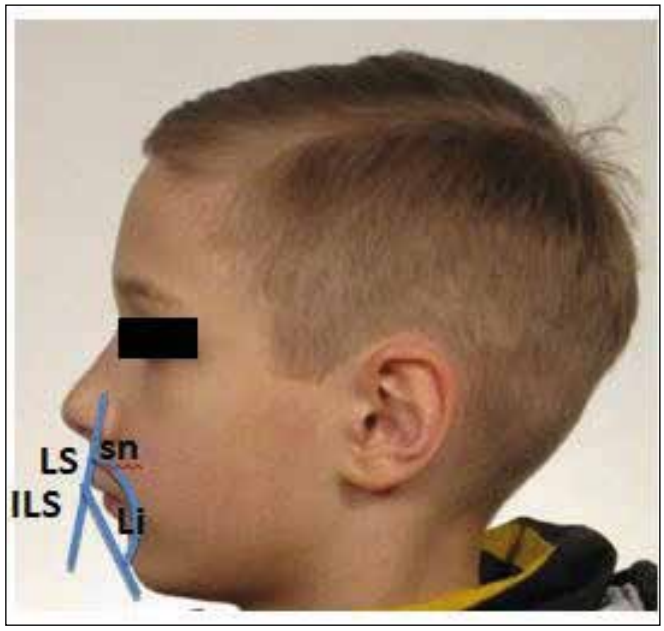

Fig. 3. Labial angle.

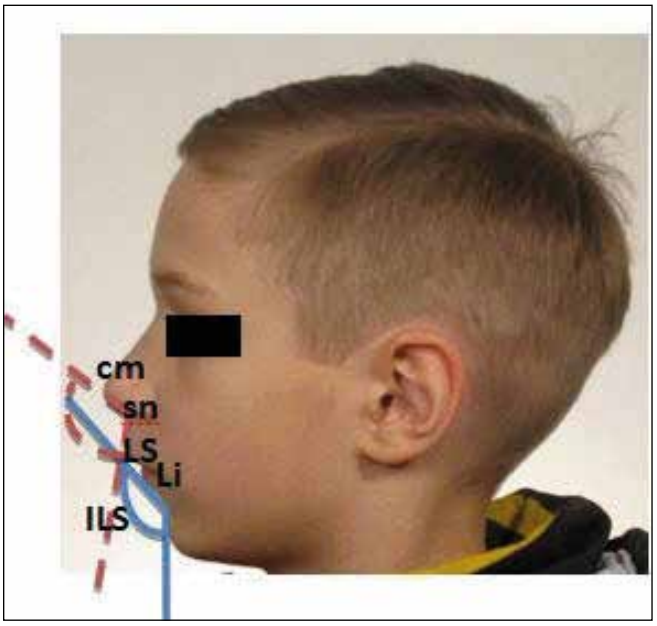

Fig. 4. Nasolabial angle (-----).
Mentolabial angle (▬).

(<gl-UL -pg), Th-me / NoV angle were measured on the photographs of the face profile.

All study materials were analyzed and statistically processed using STATISTICA program (StatSoft, Inc.).

RESULTS

Analysis of photostatic images showed that the patients with maxillodental anomalies of Angle's class I had typical changes in the face configuration. Patients demonstrated esthetic disorders: shortening of the lower part of the face, abnormal lip step, deep mentolabial sulcus, and receding chin.

The results of photometric examination of face profile of patients with different types of mandible growth (neutral, vertical, horizontal and combined) are presented in table I.

To characterize the convexity and establish the type of the lower third of the face, we measured <V (Viazis), which normally totals 13 ± 4° on average (Fig. 1). This parameter was almost the same in the group of patients with both vertical and combined (neutral and vertical) types of mandible growth (13.91 ± 0.22° and 12.67 ± 0.66°,

Table I. Photometric indicators of the face profile in patients aged 10-13 with malocclusions of Angle's class II1 before treatment

Parameter	Control group n=27	Groups according to the types of mandible growth									
		Group I n/t n=21	t	Group II v/t n=11	t	Group III h/t n=9	t	Group IV n/v n=9	t	Group V n/h n=5	t
< V Viazis	12.11±0.77	*** 17.62±0.65	5.5	* 13.91±0.22	2.3	*** 19.00±1.22	4.8	* 12.67±0.66	2.2	** 17.8±0.82	5.1
< T Schwarz	9.54±0.71	*** 13.76±0.42	5.2	** 12.36±0.35	3.3	*** 15.67±0.53	6.5	** 12.56±0.4	3.4	** 13.0±0.79	5.6
< gl-Ul-pg	181.68±1.27	*** 155.67±1.50	13	*** 156.00±0.92	21	*** 154.89±1.47	16	*** 157.56±1.24	16	*** 154.6±3.05	8.6
< Th-me/NoV	103.04±0.92	*** 96.1±0.85	5.6	* 105.64±0.79	2.2	** 97.11±1.73	3	* 105.22±0.39	2.2	** 96.4±0.76	5.5
Nasolabial angle <Ls-sn-cm	104.36±1.58	*** 115.57±0.49	6.8	*** 119.00±0.98	7.9	** 111.11±1.26	3.3	*** 122.56±1.32	8.8	** 113.8±0.65	5.5
Labial angle < Γ	127.82±1.08	* 130.1±0.32	2	*** 135.27±0.69	5.8	*** 112.67±0.53	12.6	*** 137.89±1.64	5.1	*** 112.8±1.14	9.6
Mentolabial angle	131.75±1.11	*** 124.81±1.51	3.7	*** 121.36±1.63	5.3	*** 113.11±3.25	5.8	** 137.22±1.55	2.9	** 122.2±1.29	5.6

n/t – neutral type 95%*
v/t – vertical type 99%**
h/t – horizontal type 99.9%***
n/v – neutral/vertical
n/h – neutral/horizontal

respectively). These indicators indicate a normogenic type of face in both groups. At the same time, in patients with neutral, combined (neutral and horizontal and especially neutral and horizontal types of growth), <V was statistically increased to 19.00 ± 1.22°, which is indicative of a retrogenic type of the lower third of the face.

The ratio of the upper and lower jaws in profile is determined based on the magnitude of the angle T (<T). Patients of all groups received a statistically significant increase in this indicator as compared to the control group at the average from 2.82° in cases of the vertical type of mandible growth to the largest difference in cases of the horizontal type of growth – 6.13°. The determined parameters of the profile angle (<T) correspond to the characteristics of posterior bite of varying severity.

The shape of the face profile was determined based on the angle gl-Ul-pg, which averages 170-190° (Fig. 2). In all patient groups, decrease in this angle was typical, which is indicative of the convex shape of the face profile at malocclusions of Angle's class II. The greatest reduction of this angle was found in children with horizontal and combined neutral with horizontal types of mandible growth (154.89 ± 1.47° and 154.6 ± 3.05°, respectively).

Harmony of the face profile was determined by the inclination of mandibular body to the middle nasal vertical, angle Th-me/NoV (Fig. 2). The statistically significant results show that the harmonious face profile is observed in the patients with vertical component in the type of mandible growth, the angle Th-me/NoV was within 105 ± 5°, whereas in case of neutral, horizontal mandible growth and their combination, the face profile was non-harmonious due to reduction of the specified parameter.

One of the components that usually defines the facial esthetics is the lips position. The latter is characterized with three angles: nasolabial, labial and mentolabial.

The character of the lip projection is stipulated with the same-name labial angle, the average value of which is 125 ± 10° (Fig. 3). A more expanded angle is observed in the patients with neutral, vertical and a combination of neutral and vertical types of mandible growth, which is 130.1 ± 0.32°, 135.27 ± 0.69° and 137.89 ± 1.64° respectively. In children with horizontal types of mandible growth, this angle is sharper than normal and statistically reduced by 15° compared to the control group. In our opinion, this is due to the dento-alveolar protrusion of the upper front teeth and the chin position in children of groups III and V, which proves the changes of the above parameters.

The nasolabial angle depends on the projection of the upper lip and the inclination of the lower contour of the nose, and has an average value within 100 ± 10° (Fig. 4). Studies have shown that the nasolabial angle is greater than normal in children aged 10-13 with anomalies of Angle's class II. The highest values with the statistical confidence of this parameter are reported in the patients with vertical and combined neutral/vertical type of mandible growth (119.00 ± 0.98° and 122.56 ± 1.32°, respectively).

The chin position and the depth of the supramental sulcus are indicated with mentolabial angle (Fig. 4). Normally, the mean value of this angle should be 130 ± 10°. In almost all study groups, the magnitude of this angle was within the normal range, indicating a moderately pronounced inferior labial sulcus. An exception is the group of patients with horizontal type of mandible growth, in which the

mentolabial angle was statistically significantly smaller than the control group by 18.64º. This is indicative of a deep supramental sulcus and greater severity of malocclusion in patients of group III due to distal mandible, shortening of the frontal area of the lower dentition and reduced height of occlusion as a concurrent symptom in distal occlusion.

DISCUSSION

Distal occlusion is characterized by specific facial features [1, 2, 3]. Orthodontic treatment of patients with this anomaly is accompanied by significant changes in appearance [4].

Facial photometry in patients with occlusion anomalies of Angle's class II_1 is given a lot of attention [5]. But in the domestic and foreign scientific orthodontic literature, we did not find information about the dependence of facial aesthetics on the types of mandible growth.

Facial photometry of 74 patients aged 10-13 years with occlusion anomalies of Angle's class II_1 was compared with 28 patients of class I (anomalies of the position of individual teeth).

To characterize the convexity and establish the type of the lower third of the face, we measured <V (Viazis), which exceeded the norm in all groups of patients and indicates a retrogenic type of the lower third of the face and disturbance of the anteroposterior position of the lips relative to the nose and chin. The angle of gl-Ul-pg, which was reduced in all patients regardless of the type of lower jaw bone growth, testifies to the presence of a convex shape of the facial profile in patients with Engle class II_1 occlusion anomalies.

The experimental group is characterized by a violation of the configuration of the face, namely the beveled chin, which was manifested by an increase in the profile angle T.

The harmony of the face profile is set at an angle of Th-me / NoV. The facial profile in all study groups was inharmonious due to the reduction of this parameter.

In all patients, regardless of the type of mandible growth, a decrease in the Downs facial angle was found, indicating the presence of a mesognathic facial type in patients with external maxillary anomalies of Angle's class II_1.

There is also a decrease in the labial angle, which is associated with dento-alveolar protrusion of the upper front teeth and the position of the chin.

At anomalies of Angle's class II_1 at children of 10-13 years irrespective of type of mandible growth the nasolabial angle increases.

In all study groups, the magnitude of the chin-lip angle was less than normal, which indicates the severity of the occlusion anomaly.

CONCLUSIONS

Photometric study in 55 patients aged 10-13 with maxillodental anomalies of Angle's class I and analysis of the results depending on the types of mandible growth prove the presence of a retrogenic type of the lower third of the face, convex shape of the profile, the development of posterior bite of varying severity. All patients were reported to have changes in the indicators of the lips position and non-harmonious development of their faces.

The greatest esthetic changes were reported in the group of patients with a component of horizontal type of mandible growth.

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The Authors declare no conflict of interest.

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