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A retrospective analysis of 2236 outpatients of the Clinic of Orthodontics, the most widely used X-ray method of research is used. In the clinic to determine the type of lower jaw growth among 10-13 years old children, an X-ray study, diagnostic models were made. In practical orthodontics, the most widely used method of research is orthopantomography, which allows to carry out a detailed diagnosis, to select the strategy and tactics of orthodontic intervention, to control the stages and the final result of the treatment, depending on the direction of growth of the dentofacial apparatus, it allows the doctor to give a long-term prognosis [3,12].

Recently, specialists from many countries of the world have observed an increase in the prevalence of dentofacial anomalies in children and adolescents, which, in particular, is associated with urbanization processes and environmental degradation [4]. According to WHO, the incidence of dentofacial anomalies in the world is 92% [1]. One of the most common anomalies of the dentofacial apparatus in the late interchangeable occlusion is the violation of occlusion in the sagittal direction, namely, class II, according to Angle’s classification [7]. For the timely treatment of this pathology in the pubertal period, the early detection is necessary [9]. However, the results of epidemiological studies in different regions and countries are contradictory [1,2,6-8,11], there is insufficient information on the structure of class II anomalies according to Angle’s classification with different types of lower jaw growth among 10-13 years old children. This necessitates a further study of the prevalence of dentofacial anomalies.

Purpose of the study - to study the structure of dentofacial anomalies in children and adolescents in Sumy city and Sumy oblast (Ukraine) by their applying. To identify the dentoalveolar morphological peculiarities of the occlusion in 10-13 years old patients with anomalies of class II, according to Angle’s classification with different types of lower jaw growth.

Material and methods. A retrospective analysis of 2236 outpatients of urban and rural patients with orthodontic pathology, which applied to the regional children’s clinical dental clinic (Ukraine), was conducted. The clinician considered when p < 0.05.

The form of dentofacial anomalies was established according to the Angle’s classification. Open and cross occlusions were divided in separate groups.

In addition, 76 patients with class II anomalies according to Angle’s classification aged 10-13 years were examined in the clinic to determine the type of lower jaw growth. Children underwent an X-ray study, diagnostic models were made. In practical orthodontics, the most widely used method of research is orthopantomography, which allows to carry out a detailed diagnosis, to select the strategy and tactics of orthodontic intervention, to control the stages and the final result of the treatment, depending on the direction of growth of the dentofacial apparatus, it allows the doctor to give a long-term prognosis [3,12].

Orthopantomographic examination was performed to determine the type of lower jaw growth according to the procedure described by R. Reinhardt and others [13] (Fig. 2). All patients were divided into five groups, taking into account the type of lower jaw growth: group I - 21 patients with a neutral type of growth (∟Go = 123±5°), group II - 11 children with vertical growth (∟Go > 128°), group III - 9 patients with horizontal type of growth (∟Go < 118°), group IV - 9 children with combined (neutral with vertical) type of growth, group V consists of 5 children with a combination of neutral and horizontal type of lower jaw growth. Total 152 measurements were made.

On the diagnostic models of the jaws, to determine the degree of the severity of morphological changes, the biometric indicators were calculated, since they are an important criterion for choosing a treatment tactics [5]. Morphometric examinations were carried out on 55 control-diagnostic models of the jaws of patients with a late mixed occlusion with dentofacial anomalies of class II according to Angle’s classification by the method of Linder-Hart, Korkhaus. Total 220 measurements were made.

The statistical processing of the material was carried out according to parametric criteria (mean value - M, standard error - m), statistical significance of the difference between the indices of two independent groups was carried out according to the parametric criterion (Student) using the statistical program package AtteStat 10.8.4. for MS Excel. Statistically significant differences were considered when p < 0.05.

Fig. 1. The classification of patients by age

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Results and their discussion. In the structure of dentofacial anomalies in patients of Sumy city and Sumy oblast, applying for orthodontic care, it is characteristic for all age groups that in a significant majority there are anomalies of individual teeth and dental curves (class I according to Angle’s classification) and that is ranged from 67.95% to 77.87% of cases (Fig. 3).

With regard to occlusion anomalies, in the age group of 6-9 years old patients (early mixed occlusion), the most common is an open occlusion (7.44%), which can be explained by the presence of a large number of various harmful habits at this age.

At a later age (late period of mixed and permanent occlusion), there is a decrease in the number of patients with open occlusion and class III anomalies according to Angle’s classification, which is most likely due to the elimination of bad habits at an earlier age and the eruption of permanent teeth.

The occlusion anomalies of class II according to Angle’s classification progress with age, and their percentage increases almost 9 times (from 2.87% up to 19.18%) both in 10-13 years old children and in patients older than 13 years in comparison with the early mixed occlusion.

On orthopantomograms it was found that in a significant number of examined patients the value of the jaw angles was 123±5˚, which corresponds to the neutral type of lower jaw growth (Table).

The neutral and combined types of growth were leading in boys, in girls more often the neutral (LGo = 123 ± 5˚), vertical (LGo>128˚) and horizontal (LGo<118˚) types of lower jaw growth were observed.

Among the patients with the combined growth types a combination of neutral and vertical types of lower jaw growth was revealed in 63.16%, and a combination of neutral and horizontal types of growth was revealed in 36.84% of cases.

In the biometric study of the control and diagnostic models of the jaws, a symptom complex of morphometric indices of dental curves with dentofacial anomalies of class II according to Angle’s classification, depending on the type of lower jaw growth, was established.

For patients with a neutral type of lower jaw growth, the width of the upper dental curve between the canines averages 31.72±0.25 mm at a norm of 32.47±0.25 (p=0.05) and a lower one averages 25.86±0.43 mm at a norm of 24.40±0.40 mm (p<0.01); in the region of the first premolars on the upper jaw it averages 33.89±0.54 (p=0.001), on the lower jaw - 34.17±0.61 (p<0.001) at a norm of 37.05±0.58 mm and 37.05±0.58 mm respectively. It was found that the width in the region of the first permanent molars of the upper jaw is 45.05±0.78 mm at a norm of 48.35±0.78 mm (p=0.01), of the lower one it is 46.24±0.56 mm at a norm of 48.35±0.78 (p=0.05); the length of the frontal segment of the upper dental curve is 20.53±0.33 mm (p=0.001), of the lower dental curve - 15.1±0.4 mm (p=0.01) at a norm of 18.26 ± 0.26 mm and 16.29±0.25 mm respectively.

For patients with a vertical type of lower jaw growth, the following results were obtained: the width of the upper dental curve in the region of 3/3 teeth is 33.86±0.67 mm (N=32.44±0.47 mm) (p=0.05), upper dental curve - 26.25±0.49 mm (N=24.44±0.47 mm) (p=0.01); the width between 4/4 teeth on the upper jaw is 33.9±0.54 mm (N=36.36±0.60 mm) (p=0.01), on the lower jaw – 34.1±0.66 mm (N=36.36±0.60 mm) (p=0.05). Transversal dimensions in the region of 6/6 teeth on the upper jaw are 43.95±0.69 mm (N=46.69±0.84 mm) (p<0.01), on the lower jaw - 44.52±0.50 mm (N=47.25 ± 1.07 mm) (p = 0.05); the length of the frontal part of the upper jaw is 19.12 ± 0.52 mm (N = 47.25 ± 1.07 mm) (p <0.05), of the lower jaw - 13.9 ± 0.41 mm (N = 15.9 ± 0.35 mm) (p = 0.01).

Biometric study of the control and diagnostic models of the jaws of patients with horizontal growth showed that the width of the upper dental curve between the canines averaged 31.61 mm.
occurs in 1.7 times more often than the combination of neutral and vertical type of lower jaw growth (36.84 ± 5.53%); horizontal and vertical types of jaw growth, it was established the following: the width of the upper dental curve in the region of 3/3 teeth is 33.70 ± 0.97 mm (p = 0.05); in the region of the first premolars on the upper jaw - 33.16 ± 0.69 mm (N = 32.92 ± 0.59 mm) (p = 0.05), of the lower one - 26.94 ± 0.46 mm (N = 24.76 ± 0.68 mm) (p < 0.01); between 4/4 teeth on the upper jaw - 34.84 ± 0.61 mm (N = 36.97 ± 0.74 mm) (p = 0.01), on the lower jaw - 34.77 ± 0.37 mm (N = 36.97 ± 0.74 mm) (p = 0.05). Transversal dimensions in the region of 6/6 teeth on the upper jaw are 45.37 ± 0.82 mm (N = 48.24 ± 0.97 mm) (p < 0.01), at the lower jaw - 45.72 ± 0.51 mm (N = 48.24 ± 0.97 mm) (p = 0.05); the length of the frontal segment of the upper dental curve is 20.97 ± 0.38 mm (p = 0.001), of the lower one it is 14.78 ± 0.39 mm (p = 0.01) at a norm of 17.73 ± 0.5 mm and 16.03 ± 0.44 mm respectively.

For children who have a combination of neutral and vertical type of lower jaw growth, it is typically the following: the width of the upper dental curve in the region of 3:3 teeth is 33.70 ± 0.14 mm (N = 32.92 ± 0.28 mm) (p = 0.05), of the lower one - 26.94 ± 0.46 mm (N = 24.76 ± 0.68 mm) (p < 0.01); between 4/4 teeth on the upper jaw - 34.84 ± 0.61 mm (N = 36.97 ± 0.74 mm) (p = 0.01), on the lower jaw - 34.77 ± 0.37 mm (N = 36.97 ± 0.74 mm) (p = 0.05). Transversal dimensions in the region of 6/6 teeth on the upper jaw are 45.37 ± 0.82 mm (N = 48.24 ± 0.97 mm) (p < 0.01), at the lower jaw - 45.72 ± 0.51 mm (N = 48.24 ± 0.97 mm) (p = 0.05); the length of the frontal segment of the upper dental curve is 20.97 ± 0.38 mm (p = 0.001), of the lower one it is 14.78 ± 0.39 mm (p = 0.01) at a norm of 17.73 ± 0.5 mm and 16.03 ± 0.44 mm respectively.

Under the combination of neutral and horizontal type of lower jaw growth, it was established the following: the width of the upper dental curve between the canines averages 32.44 ± 0.37 mm at a norm of 33.78 ± 0.59 mm (p = 0.05) and of the lower one it is 23, 1 ± 0.52 mm at a norm of 24.42 ± 0.57 mm (p < 0.01); in the region of the first premolars on the upper jaw - 33.16 ± 0.69 mm (p = 0.001), at the lower jaw - 35.16 ± 0.63 mm (p < 0.001) at a norm of 37.1 ± 0.57 and 37.1 ± 0.57 mm respectively. It was found that the width in the region of the first permanent molars of the upper jaw is 44.28 ± 0.39 mm at a norm of 47.36 ± 0.63 mm (p = 0.01), of the lower one - 44.12 ± 0.61 mm at a norm of 47.36 ± 0.63 mm (p = 0.05); the length of the frontal segment of the upper dental curve is 20.66 ± 0.55 mm (p = 99.9), of the lower - 15.76 ± 0.37 mm (p = 0.01) at a norm of 18.22 ± 0.89 mm and 16.56 ± 0.24 mm, respectively.

Conclusion. Orthodontic care in the Sunny Oblast Children’s Clinical Dental Clinic is mainly used by children from 10 to 13 years old. The anomalies of individual teeth and dental curves were leading in all age groups (71.24%).

Among the occlusion anomalies in 10-13 years old children, a significant proportion falls on the class II according to Angle’s classification (19.18%).

A third of 10-13 years old patients, with class II anomalies according to Angle’s classification, has a neutral type of lower jaw growth (36.84 ± 5.53%), horizontal and vertical types of growth are 18.42 ± 4.47% and 19.74 ± 4.56% respectively. The combination of neutral and vertical type of lower jaw growth occurs in 1.7 times more often than the combination of neutral and horizontal types.

In all groups, a characteristic symptom complex of morphological changes in the dental curves of the upper and lower jaws of different severity was established. The most pronounced morphological changes are observed in the group of patients with a horizontal type of lower jaw growth.
SUMMARY

DEPENDENCE OF MORPHOMETRIC PARAMETERS OF THE DENTAL OCCLUSION ON THE TYPE OF THE LOWER JAW GROWTH IN CHILDREN WITH CLASS II DENTOFACIAL ANOMALIES WHO LINE IN THE NORTHERN UKRAINE

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The aim of the work was to study the structure of dentofacial anomalies in children and adolescents in Sumy city and Sumy oblast, to identify dentoalveolar morphological peculiarities of the occlusion in 10-13 years old patients with class II anomalies according to Angle’s classification with different types of lower jaw bone growth.

A retrospective analysis of 2236 outpatient dental cards of urban and rural patients with orthodontic pathology was conducted. Patients were divided into three age groups: 6-9 years old (early mixed occlusion) - 592 children; 10-13 years old (late mixed occlusion) - 1180 children; over 13 years old (permanent occlusion) - 464 persons; besides 76 patients with class II anomalies according to Angle’s classification aged 10-13 years were examined. To determine the type of lower jaw growth, the children underwent orthopantomographic examination, diagnostic models were made and biometric indicators were calculated to determine the severity of the morphological changes.

It was established that anomalies of individual teeth and dental curve dominated in all age groups (71.24%). Among the occlusional anomalies, a large part falls to class II anomalies according to Angle’s classification (19.18%). A third of these patients have a neutral type of lower jaw growth (36.84±5.53%), horizontal and vertical types of growth reach 18.42±4.47% and 19.74±4.56%, respectively. The combination of neutral and vertical type of growth of the lower jaw occurs in 1.7 times more than the combination of neutral and horizontal. The most pronounced morphological changes were observed in the group of patients with a horizontal type of lower jaw growth.

When planning treatment and prophylactic measures among patients of the orthodontic profile, it is necessary to take into account the peculiarities of both the prevalence of pathology in the region and the morphological changes of different severity in the dental curves of the jaws.

Keywords: dentofacial anomalies, prevalence of dentofacial anomalies, class II according to Angle’s classification, growth of jaws, types of jaw growth, orthopantomography, morphometry.

Целью исследования явилось изучение структуры зубочелюстных аномалий у детей и подростков города Сумы и Сумской области и выявление зубоальвеолярных морфологических особенностей прикуса у пациентов 10-13 лет с аномалиями II класса по Энглю с разным типом роста нижней челюсти.

Проведен ретроспективный анализ 2236 амбулаторных стоматологических карточек городских и сельских пациентов с ортodontической патологией. Пациенты были разделены на три возрастные группы: дети в возрасте от 6-9 лет (ранний смешанный прикус) - 592; 10-13 лет (поздний смешанный прикус) - 1180 детей; выше 13 лет (постоянный прикус) - 464; кроме того, обследовано 76 пациентов с аномалиями II класса по Энглю в возрасте 10-13 лет. Для определения типа роста нижней челюсти детям проведено ортопантомографическое исследование, изготовлены диагностические модели и по ним рассчитаны биометрические показатели для выявления степени тяжести морфологических изменений.

Установлено, что во всех возрастных группах доминировали аномалии отдельных зубов и зубных рядов (71.24%). Среди аномалий прикуса значительная часть приходится на II класс по Энглю (19,18%). У трети этих пациентов наблюдается нейтральный тип роста нижней челюсти (36,84±5,53%), горизонтальный и вертикальный типы роста составили 18,42±4,47% и 19,74±4,56%, соответственно. Сочетание нейтрального и вертикального типов роста нижней челюсти встречается в 1,7 раза больше, чем сочетание нейтрального с горизонтальным. Наиболее выраженные морфологические изменения наблюдались в группе пациентов с горизонтальным типом роста нижней челюсти.

При планировании лечебно-профилактических мероприятий среди пациентов ортodontического профиля необходимо учитывать особенности как распространенности патологии в регионе, так и морфологические изменения зубных рядов челюстей разной степени тяжести.
Dentoalveolar anomalies are one of the first places for the prevalence of dental caries and periodontal disease [1,4,14,18]. The fundamental researches are held such as cytological, microbiological and others [2,8,10,15].

In modern dentistry, preventing dental caries is very important, which is aimed at reducing the number of bacteria and increasing the tooth resistance to various influences, as the major causative agent of dental caries is the opportunistic pathogenic oral microflora and its metabolic products. The research results show that the orthodontic treatment changes the qualitative and quantitative oral microflora composition: increases the number and frequency of microbial strains, the symbiotic microflora ceases to perform barrier role for non-residents, pathogenic staphylococci and yeast-like fungi actively vegetate. According to Patack N.E. et al, and Pramod S. [16,17] the microbial contamination creates conditions for developing inflammation in paradontium edge. It is also known that when wearing orthodontic appliances in the oral cavity, there is an increased amount of Streptococcus mutans, Candidaibicans, Lactobacillus spp., Enterobacteriaceae spp., which are a key link in developing teeth demineralization and periodontal diseases.

Clinical and microbiological studies by several authors have shown that using orthodontic appliances leads to a statistically significant increase in the percentage of bacteria containing the diagnosed microorganisms.