DODAQ VƏ DAMAĞIN ANADANGƏLMƏ BİRTƏRƏFLİ YARIĞI OLAN UŞAQLARDA DİŞ-ÇƏNƏ ANOMALİYALARININ VƏ DEFORMASİYALARININ STRUKTURU

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Xülasə. Dodaq və damağın birtərəfli anadangəlmə yarıqları olan uşaqlarda diş-çənə anomaliyalarının strukturunu öyrənmək məqsədilə tədqiqat aparılmışdır. Tədqiqata yaşı 5-dən 14-ə qədər olan 137 xəstə uşaq cəlb edilmişdir. Bütün tədqiq edilənlərin məlumatlarını təhlil edərkən diş-çənə anomaliyalarının və deformasiyalarının komponentləri üzrə bir neçə simptomokompleks müəyyənləşdirilmişdir. Prioritet təşkil edən komponent olaraq, köndələn və boylama müstəvilər üzrə deformasiyalar ayırd edilmişdir. Tədqiq edilən simptomokompleksin 5 komponenti ayırd edilmişdir ki, onlar da oğlan və qızlardan ibarət qruplarda bir-birindən statistik etibarlı olaraq fərqlənmişdir. Deformasiyaların 3 qrupu ayırd edilmişdir: köndələn səth üzrə, boylama səth üzrə, köndələn və boylama səthlər üzrə olan deformasiyalar. Bu deformasiyalar yarıq sahələrində diş qövslərinin və alveolyar çıxıntıların qüsurları ilə bu sahələrdə dişlərin çıxmasının qüsurları ilə, orta xəttin yerdəyişməsi ilə, dişlərin formalarının, sayının və yerləşməsinin anomaliyaları ilə ağırlaşa bilər. Müəlliflərin fikrincə, diş-çənə anomaliyalarının strukturunun öyrənilməsi profilaktika tədbirlərinin həcmini müəyyənləşdirməyə, ixtisaslaşdırılmış mərhələli çoxprofilli yardımın təşkilinə kömək edə bilər, fərdi şəkildə dinamik təsiretmə vasitəsilə yeni diaqnostika və müalicə metodlarının hazırlanmasına şərait yarada bilər.

Açar sözlər: dodaq və damaq yarığı, köndələn müstəvidə üz-çənə deformasiyaları, sagittal müstəvidə üz-çənə deformasiyaları

Ключевые слова: расщелины губы и нёба, челюстно-лицевые деформации в трансверзальной и сагиттальной плоскостях

Key words: frequency, deformations in the transverse plane, deformations in the sagittal plane, cleft lip and palate

STRUCTURING OF DENTOGNATHIC ANOMALIES AND DEFORMATIONS IN CHILDREN WITH CONGENITAL UNILATERAL CLEFT LIP AND PALATE

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The article presents the results of research on the structure of dentognathic anomalies and deformations in children with congenital unilateral cleft lip and palate. For this purpose, 137 patients aged 5 to 14 years were examined. During analysis of the data, several components of the dentognathic anomalies and deformations symptom complex were established simultaneously in all the study subjects. Deformations in the transversal and sagittal planes and combined pathologies in the sagittal and transversal planes were prioritized. Five components of the symptom complex were identified, the frequency of which is statistically significantly different (p<0.05) in the groups of girl and boy patients. Deformations are divided into three groups: deformations in the transverse plane, deformations in the sagittal plane, deformations in the transverse and sagittal planes, which can be complicated by defects of the dental arch and alveolar process at the cleft site, teeth eruption in the defect area, midline shift, anomalies of shape, eruption, number and position of teeth. The structuring allows to determine the scope of preventive measures, improve the organization of the provision of specialized staged multidisciplinary care, contributes to the development and implementation of new methods of diagnosis and treatment based on dynamic individualized influence.

Introduction. The prevalence of dentognathic anomalies and deformations (DAD) is rather high, and has variability of 30 to 97% [1]. Congenital cleft lip and palate (CLP)

occurs in more than 70% of malformations of the maxillofacial region [2, 3]. At the same time, 80-94% of children with CLP present with DAD. The most pronounced deformations are in the case of through clefts [2-5]. In majority of scientific publications, DAD in congenital CLP is structured into classes I, II and III according to Angle`s classification [1, 6-8]. In children with congenital CLP, narrowing and/or shortening of the dental arches, maxillary micrognathia in combination with mesial bite and/or crossbite are the most common. Deformations can be complicated by anomalies in the number, eruption, shape and position of teeth, dentoalveolar disproportion, defects of the dental arches [3-5].

The structuring of DAD and their percentage characteristics in congenital unilateral cleft lip and palate (UCLP) are not sufficiently covered in scientific sources. The structure is provided without taking into account the anatomical and topographic features of clefts, their severity and not always taking into account the gender.

The aim: to structure dentognathic anomalies and deformations in children with congenital unilateral cleft lip and palate.

Material and methods. An examination of 137 patients with UCLP aged 5 to 14 years was conducted. The examination included subjective and objective methods; an orthodontic treatment plan was developed, taking into account the stages of surgical interventions and multidisciplinary support by other specialists. Among the subjects, girls (n=56) made up 40.9% with an average age of 9.3 years (mean error ±0.3), boys (n=81) – 59.1% with an average age of 8.9 years (mean error ±0.3).

The study inclusion criteria were as follows: children with UCLP at the stages of orthodontic treatment, temporary and transitional occlusion periods, parental consent to participate in the study. Exclusion criteria were as follows: lack of complete documentation of the case, parents' refusal to participate in the study.

Statistical analysis of available data was carried out using specialized statistical software MedStat v. 5.2 (Ukraine, Free Software License) and Jamovi v. 2.3 (The Jamovi Project (2023), GNU Affero General Public License v3.0).

Results. When analyzing the data of children-patients with UCLP (n=137), several components of the DAD symptom complex were simultaneously identified in all study subjects (100%). Among them cases with left-sided clefts (LSCs) quantitatively dominate over cases with right-sided clefts (RSCs). LSCs were detected in 116 patients out of 137 (84.7%), RSCs – y 21 (15.3%). Among girls, LSCs made up 83.9% (95% CI 73.0-92.4), RSCs – 16.1% (95% CI 7.6-27.0); among boys, LSCs made up 85.2% (95% CI 76.5-92.1), RSCs – 14.8% (95% CI 7.9-23.5).

Calculation of the frequency of the presence or absence of individual components of the DAD symptom complex among all study subjects (n=137) and in groups of girl patients (GP) (n=56) and boy patients (BP) (n=81) allowed to systematize the anomalies and deformations in the nominal scale format. Deformations in the transverse and sagittal planes were identified as priority components, which were observed in 90.5% and 88.3% of children, respectively, and combined pathologies in the sagittal and transverse planes – in 79.6% (Table 1).

Components of DAD symptom complex diagnosed in the group of children with UCLP (n=137) in the order of decreasing frequency of detection are presented in the Table 2.

Table 1. Priority frequency of detection of components of the dentognathic anomalies and deformations symptom complex

No.	Components of DAD symptom complex in UCLP	Frequency, all patients (n=137), %	Frequency, girls (n=56), %	Frequency, boys (n=81), %	Frequency difference for B-G, % (p<0.05)
1	Deformations in the transverse plane	90.5	83.9	95.1	11.2 p=0.032
2	Deformations in the sagittal plane	88.3	89.3	87.7	-
3	Deformations in the transverse and sagittal planes	79.6	75.0	82.7	-

Table 2. Components of dentognathic anomalies and deformations symptom complex

No.	Components of DAD symptom complex in UCLP	Frequency, all patients (n=137), %	Frequency, girls (n=56), %	Frequency, boys (n=81), %	Frequency difference for B-G, % (p<0.05)
1	Defects of the dental arch and alveolar process	82.5	73.2	88.9	15.7 (p=0.036)
2	Teeth eruption in the defect area	78.8	69.6	85.2	15.6 (p=0.048)
3	Midline shift	70.8	58.9	79.0	20.1 (p=0.019)
4	Crowding	46.7	51.8	43.2	-
5	Diastema	40.1	35.7	43.2	-
6	Tortoanomaly	38.0	35.7	39.5	-
7	Dentoalveolar disproportion	37.0	38.6	35.9	-
8	Retention	21.2	25	18.5	-
9	Palatal position	19.7	33.9	9.9	-24.0 (p=0.001)
10	Adentia / Hyperdentia	17.5	14.3	19.8	-
11	Anomalies of shape	6.6	1.8	9.9	-
12	Vestibular position	2.2	1.8	2.5	-

Additional examination methods allowed to identify deviations from the individual normal range of the size and shape of the jaws and dental arches. Narrowing and/or shortening of the dental arches of the upper jaw were established in 99.3% of cases, and maxillary micrognathia in 83.9% (Table 3).

Based on the results of the analysis, 5 components of the DAD symptom complex in UCLP were identified, the frequency of which is statistically significantly different (p<0.05) in the GP (n=56) and BP (n=81) groups.

When applying Fisher's angular transformation method, taking into account Yates' correction, to determine the confidence interval of the frequency of detection of components of the DAD symptom complex in the GP group, deformations in the transverse plane (DTP) comprise 83.9% (95% CI 73.0-92.4). They are 95.1% (95% CI 89.2-98.7) in the BP group, which is statistically significantly higher by 11.2% (p=0.032)

according to the results of the comparison of the percentages in the two groups. The ratio of the probability of detecting a DTP in both groups is 1.13 (OR≥1.02 at the level of significance p=0.05) (Fig. 1).
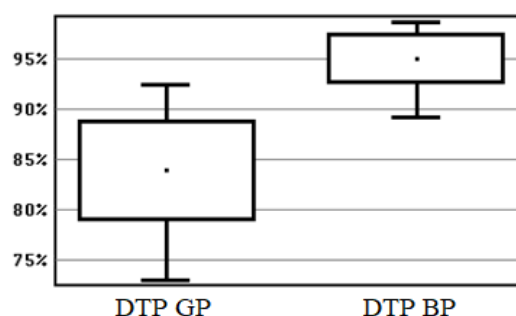

Fig. 1. Diagram of the interval characteristics of the frequency of detection of the deformation component in the transverse plane (DTP) in the groups of girl patients (GP) and boy patients (BP).

Determination of the confidence interval of the frequency of detection of defects of the

Table 3. Frequency of detection of deviations from the individual normal range of the size and shape of the jaws and dental arches

No.	Components of DAD symptom complex in UCLP	Frequency, all patients (n=137), %	Frequency, girls (n=56), %	Frequency, boys (n=81), %	Frequency difference for B-G, % (p<0.05)
1	Narrowing and/or shortening	99.3	98.2	100	-
2	Maxillary micrognathia	83.9	82.1	85.2	-

dental arch and alveolar process at the cleft site (DDA) of the DAD symptom complex in the GP group showed that the frequency of defects reaches 73.2% (95% CI 60.7-84.1). In the BP group, the DDA was 88.9% (95% CI 81.0-94.8), which is 15.7% (95% CI 2.6-29.5) statistically significantly more (p=0.036) than in GP. The ratio of the probability of DDA detection in both groups is 1.21 (1.02≤OR≤1.45 at the level of significance p=0.05) (Fig. 2a). When determining the confidence interval of the detection frequency of the teeth eruption in the defect area (TED) of the DAD symptom complex in the GP group, it was shown that the eruption frequency is 69.6% (95% CI 56.8-81.1). It was 85.2% (95% CI 76.5-92.1) in the BP group, which is 15.6% statistically significantly more (p=0.048) than GP, according to the results of the comparison of the percentage in the two groups. The ratio of the probability of detecting TED in both groups is 1.22 (OR≥1.04 at the level of significance p=0.05) (Fig. 2b).

When determining the confidence interval of the frequency of detection of the midline shift (MLS) component of the DAD symptom complex in the GP group, it was shown that the MLS in GP is 58.9% (95% CI 45.6-71.6). In the BP group, it is 79.0% (95% CI 69.4-87.2), which is 20.1% (95% CI 4.5-35.1) statistically significantly more (p=0.019) than in the GP group. The ratio of the probability of detecting an MLS in both groups is 1.34 (1.05≤OR≤1.71 at the level of significance p=0.05) (Fig. 3a). When determining the confidence interval of the detection frequency of the component of the palatal position of the teeth (PPT) of the DAD symptom complex in the GP group, it is 33.9% (95% CI 22.0-47.0). In the BP group, it is 9.9% (95% CI 4.3-17.4), which is 24.0% (95% CI 10.2-38.0) statistically significantly less (p=0.001) than in the GP group. The probability of detecting PPT in GP are greater than in BP, and the corresponding odds ratio is 3.44 (1.62≤OR≤7.29 at the significance level of p=0.05) (Fig. 3b).
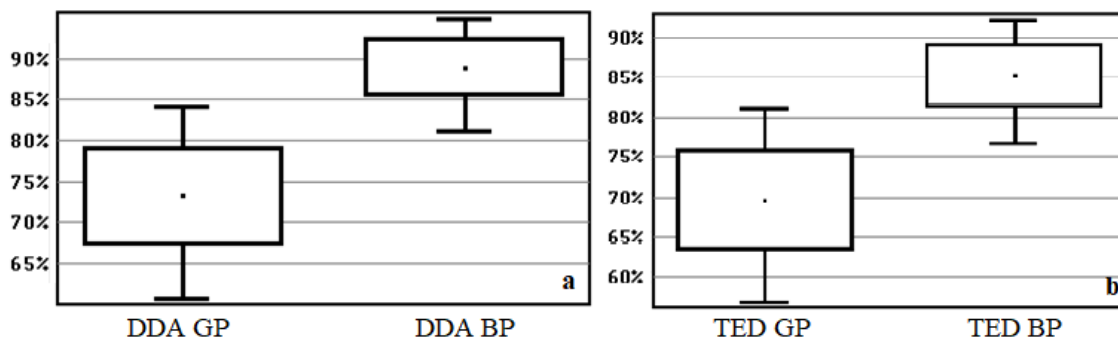

Fig. 2. Diagram of the interval characteristics of the frequency of detection of components of defects of the dental arch and alveolar process at the cleft site (DDA) (a) and teeth eruption in the defect area (TED) (b) in the groups of girl patients (GP) and boy patients (BP).
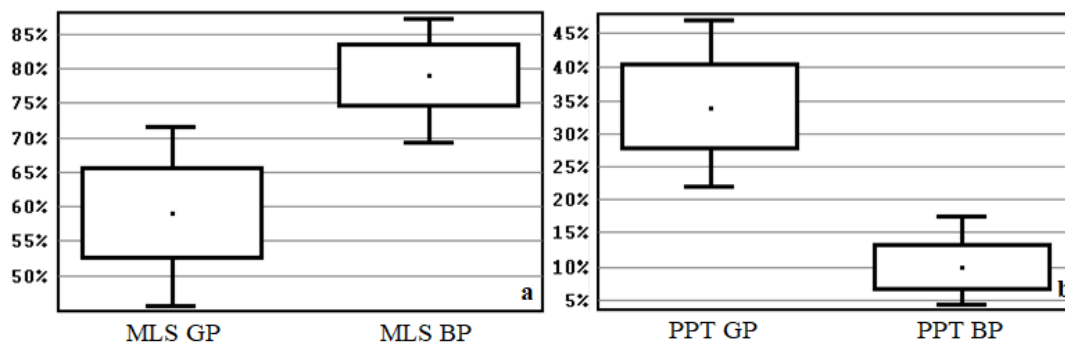

Fig. 3. Diagram of the interval characteristics of the detection frequency of components of midline shift (MLS) (a) and palatal position of teeth (PPT) (b) in groups of girl patients (GP) and boy patients (BP).

In view of the above, we consider it appropriate to structure DAD in children with UCLP into three groups: deformations in the transverse plane, deformations in the sagittal plane, deformations in the transverse and sagittal planes.

Deformations can be complicated by defects of the dental arch and alveolar process at the cleft site, teeth eruption in the defect area, midline shift, anomalies of shape (microdentia, macrodentia, accreted, fused or doubled teeth), eruption (retention), number (adentia, hyperdentia) and position (vestibular, oral, dentoalveolar disproportion, diastema, treme, tortoanomaly, crowding) of teeth.

Discussion. The conducted study confirms the statistical data given in modern scientific sources about the almost equal frequency of CLP occurrence in girls and boys [7] and the quantitative predominance of LSCs over right-sided ones [2, 3].

The classification of DAD proposed by Angle divides orthodontic pathologies into classes according to their morphological characteristics. It is based on the principle of the ratio of dental arches as a whole [1]. When applying the principles of DAD structuring using Angle's classification, conflicting data on their prevalence are given. Thus, with UCLP, the maximum number of malocclusions of class II is 10.7%, class III – 4.9% [6], anomalies of class I were observed in 73.1%, class III – in 15.4%, class II – 11.5% [7]. The rationale for consideration of preoperative orthodontic treatment and planning of surgical interventions based on skeletal phenotypes of patients of I, II or III classes, respectively, is given [8]. However, the use of Angle's classification for the structuring of DAD in CLP does not allow to fully characterize the set of problems caused by clefts. On the basis of our research, we consider it expedient to structure DAD in UCLP according to the severity of existing deviations in the three planes, indicating the anomalies that complicate them.

A comprehensive approach to the orthodontic rehabilitation of children with congenital defects, taking into account the percenttage characteristics of the prevalence and structure of DAD, multifactorial determination of CLP, allows to reduce the severity of orthodontic pathology caused by both congenital defects and surgical intervention [2-5]. Taking into account the anatomical and topographic features of clefts and DAD, their severity and gender, the main task of orthodontic correction at various stages of rehabilitation of children with UCLP can be seen. It consists in reducing the number orthognathosurgical interventions, the percentage of which, according to various authors, ranges from 14% to 75% [9].

Conclusions

The structuring of DAD in children with UCLP into groups according to the severity of deformations in the transverse and sagittal planes and indicating the pathologies that complicate them allows to determine the scope of preventive measures and organize the provision of specialized staged multidisciplinary care, contributes to the development and implementation of new methods of their diagnosis and treatment based on dynamic individualized influence.

The Authors declare no conflict of interest.

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СТРУКТУРИРОВАНИЕ ЗУБОЧЕЛЮСТНЫХ АНОМАЛИЙ И ДЕФОРМАЦИЙ У ДЕТЕЙ С ВРОЖДЕННЫМИ ОДНОСТОРОННИМИ РАСЩЕЛИНАМИ ГУБЫ И НЁБА

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Резюме. С целью структурирования зубочелюстных аномалий и деформаций у детей с врожденными односторонними расщелинами губы и нёба было обследовано 137 пациентов в возрасте от 5 до 14 лет. При анализе данных у всех обследованных одновременно установлено несколько компонентов симптомокомплекса зубочелюстных аномалий и деформаций. В качестве приоритетных компонентов выделены деформации в трансверзальной и сагиттальной плоскостях. Выявлено пять компонентов симптомокомплекса, частота которых статистически достоверно различается (p<0,05) в группах пациентов девочек и мальчиков. Деформации разделены на три группы: в трансверзальной плоскости, в сагиттальной плоскости, в трансверзальной и сагиттальной плоскостях, которые могут осложняться дефектами зубной дуги и альвеолярного отростка в месте расщелины, прорезыванием зубов в месте дефекта, смещением срединной линии, аномалиями формы, прорезывания, количества и положения зубов. Структурирование зубочелюстных деформаций позволяет определить объем профилактических мероприятий, улучшить организацию оказания специализированной этапной многопрофильной помощи, способствует разработке и внедрению новых методов диагностики и лечения, основанных на динамическом индивидуализированном воздействии.

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