POINT OF VIEW

I.D. Ushnitsky, T.V. Alekseeva, K.G. Piksaykina-Grigorieva, I.S. Pinelis, A.V. Yurkevich

THE DIAGNOSTIC METHOD FOR MAXILLA CONSTRICTION BIOMETRIC PARAMETERS DUE TO THE HARD PALATE VAULT HEIGHT IN CHILDREN AND ADOLESCENTS WITH VARIOUS DEGREES OF SEVERITY OF CONNECTIVE TISSUE DYSPLASIA

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Today, there is a high prevalence of connective tissue dysplasia (CTD) among children and adolescents. It manifests as general and local phenotypic features. Among its local manifestations, gothic palate and dentoalveolar anomalies are most frequently diagnosed. We have developed a new device for measuring the maxilla constriction at different CTD severity and a method for determining the maxilla constriction at congenital deformities of the hard palate in children at different CTD severity. The use of this device and method in identifying local (organs and tissues of the oral cavity) CTD signs contributes to more rapid adoption of comprehensive therapeutic and preventive actions to restore constrictions and maxillofacial anomalies of the upper jaw without complex clinical and diagnostic measures.

Keywords: connective tissue dysplasia, phenotypic features, maxilla, gothic palate, dental deformity, treatment, prevention.

Introduction. Nowadays the dental anomalies frequency among schoolchildren is determined as a high level [4, 23, 26]. At the same time, a wide range of pathogenesis and etiological factors cause certain difficulties in solving the problems of their treatment and prevention [8, 30]. Meanwhile, the dentoalveolar system anomalies are considered as an isolated pathology, as well as multifactorial, environmental and genetic diseases [11, 20, 24]. CTD belongs to the heterogeneous group of pathologies associated with hereditary factors, where their phenotypic features are related to this pathology [1, 2, 10, 21, 25]. At the same time, the common CTD manifestations of phenotypic features are associated with changes in connective tissue metabolic processes that contribute to the development of pathological processes of the musculoskeletal system, circulatory organs and abdominal cavity, etc. [3, 9, 19, 22, 31].

It should be noted that the connective tissue, with its constituent components is the basis for the organs and tissues of the dentoalveolar system, and make their complete functioning [6, 7, 12, 27]. At the same time, local CTD manifestations contribute to a decrease in dental caries resistance and an increase in pathological processes of periodontal tissues, anatomical deformation of the hard palate, dental anomalies, temporomandibular joints, etc. [5, 13, 14, 28]. Meanwhile, the dental aspects of this problem have not been studied sufficiently today, where it has been established that one of the CTD markers is the gothic palate, which determines the nature of morphofunctional changes in the dentoalveolar system [15, 16, 17, 18, 29]. The research improving the treatment, prevention and rehabilitation of local CTD manifestations in children and adolescents has theoretical, scientific and practical significance in dentistry.

The aim of the research is to determine the degrees of dentition constriction on the basis of a comprehensive clinical and biometric study of anatomical maxilla deformities taking into account congenital deformities of the hard palate in children and adolescents with different degrees of connective tissue dysplasia severity.

Materials and methods of the study. We have carried out a survey of 956 children and adolescents aged from 12-15 years old with congenital connective tissue differentiation disorders. The examination included educational establishments of the Republic of Sakha (Yakutia):

– Yakutsk schools (School No. 5, School № 2, School № 35, Yakutsk City Lyceum, Yakutsk City Gymnasium, School № 26, Gymnasium № 8, School № 9).

– Village Pokrovsk, Khangalassky ulus (district) (Schools No. 1 and No. 2.)

– villages Mokhsogollokh, Tekhtyur, Oktemtsy, Chapaevo, Nemugyuntsy, Kyl-Bastakh, Oy and Ulakhan-An.

The CTD severity was interpreted by T. Milkovska-Dmitrova and A. Karkashev's method (1985). The CTD severity in the examined children and adolescents was calculated according to the sum of scores: the sum of scores does not exceed 12 in a mild degree, 23 - in a moderate degree, and 24 or more - in a severe degree. The depth of the hard palate vault in case of deformities was diagnosed by a well-known device for measuring the height of the hard palate vault [15].

A biometric study of the hard palate vault height with different CTD severity degrees was carried out, in 629 at dental consultation and in 327 jaw models according to the method of Ushnitsky I.D., Nikiforova E.Yu., Ammosova A.M. (2018) [16]. Cast models of the jaws were obtained at dental consultation, then biometric measurements were performed at

USHNITSKY Innokentiy Dmitrievich – Doctor of Medicine, Professor, head of the Department of therapeutic, surgical, orthopedic dentistry and pediatric dentistry of the Medical Institute of M.K. Ammosov North-Eastern Federal University, Yakutsk, e-mail: incadim@mail.ru; **ALEKSEEVA Tatiana Vasilievna** – head of the children's dental department of Yakutsk Specialized Dental Center, Yakutsk, e-mail: tanina2708@gmail.com; **PIKSYAKINA-GRIGORIEVA Ksenia Gennadievna** – Candidate of medical sciences, associate professor of therapeutic, surgical, orthopedic dentistry and pediatric dentistry of the Medical Institute of M.K. Ammosov North-Eastern Federal University, e-mail:ksupixar@gmail.com; **PINELIS Joseph Semenovich** – Professor, Academician of the Russian Academy of Natural Sciences "Chita State Medical Academy", e-mail: pinelis1@mail.ru, Tel: 89145200178; **YURKEVICH Alexander Vladimirovich** – MD, PhD, professor, head of orthopedic dentistry, Far Eastern State Medical University, Ministry of Health Care of Russia, e-mail: dokdent@mail.ru

Dependence of the narrowing of the upper jaw on the severity of connective tissue dysplasia (mm)

Indicators of narrowing of the upper jaw are mild	Mild degree (the depth of the height of the arch of the hard palate is up to 18.0+0.02 mm)		Moderate degree (depth of the firmament arch height from 19.0+0.04 up to 27.0+0.3 mm)		Severe degree (depth of the firmament arch height from 28.0 +0.03 up to 32.0+ 0.02 mm)	
	distance between premolars	distance between molars	distance between premolars	distance between molars	distance between premolars	distance between molars
Minimum values	-9.87±0.46	-10±0.47	-12.2±0.36	-14±0.18	-9.5±0.59	-17.12±0.74
Maximum values	+5.51±0.38	+7.69±0.40	+3.53±0.11	+6.13±0.15	-5.24±0.53	-3.37±0.82
Average values	-2.57±0.13	-2.16±0.15	-2.90±0.17*	-2.57±0.24*	-6.69±0.47**	-6.58±0.43**

Note. Statistical significance of differences in the narrowing of the upper jaw in DST: * - mild and moderate severity; ** - moderate and severe severity.

the Department of Therapeutic, Surgical, Orthopedic Dentistry and Pediatric Dentistry of the Medical Institute of M.K. Ammosov North-Eastern Federal University and Yakutsk Specialized Dental Center. Morphometric studies of anatomical deformities of the hard palate were performed by a special device for measuring the height of the hard palate vault [15], the upper jaw was performed on diagnostic models using a special caliper having fixed and movable jaws for measuring external dimensions made in a truncated plate form, which are designed for fixing removable intraoral pads for fixed and movable measuring jaws (patent № 205333 dated 09.07.2021). To obtain objective data, we used Pont-Linder-Hart's method for determining the width of dental rows in children and adolescents, where we found the relationship between the total values of the mesiodistal incisors and the width of the dental row in the area of the first premolars and molars. Further, we interpreted the obtained data of maxillary constriction depending on the parameters of the hard palate vault height at different CTD severity.

The research was regulated by the basic documents of organization of scientific research in Russia.

Statistical analysis of the results was carried out with a package of programs "SPSS" version 22, license "IBM SPSS 22", as well as Pearson correlation analysis (r) and factor analysis by Varimax method.

Results and discussion. The data showed the presence of some peculiarities. Thus, our biometric studies established the variability of morphological deformities of the maxilla constriction depending on the hard palate vault height in different degrees of CTD severity in the examined age groups of children. According to the frequency of its various severity, the average degree prevailed (55,12±1,05%), followed by the mild form - 32,05±1,59%, and the lowest indices were found at the severe degree - 12,83±2,04%.

The hard palate vault height was measured by our own device [15] according to successive technological steps. If cast diagnostic models were used, the height of the hard palate vault was measured with the use of our device. For this purpose, a bar was placed between the second premolars and the first molars of the upper jaw to create a horizontal reference point and the measuring ruler was advanced to the stop (to the deepest [high] point of the hard palate vault).

Analysis of the results indicates the presence of some features of maxillary constriction depending on the CTD severity, taking into account the depth of change in the hard palate vault (Table). Thus, when the depth of the gothic palate is pronounced in the examined schoolchildren with mild CTD, the indexes of variability in the upper jaw constriction by measuring points between premolars is 15,38± 0,08 mm and molars is 17,69± 0,07 mm. Whereas, the average values respectively characterized maxillary constrictions within -2,57± 0,13 and -2,16± 0,13 mm. Meanwhile, the dynamic changes in the studied parameters became more pronounced, where the values of the distances between premolars and molars were at the level of numerical values 15,73± 0,08 and 20,13± 0,06 mm in CTD moderate severity. At the same time, the mean values were -2,90 ± 0,17 and -2,57± 0,24 mm, which when compared with the mild degree have significant differences (P<0.05). Children with severe CTD pronounced changes in the height of hard palate vault accompanied by significant deformities of the maxillary dentition in the form of its pronounced deformities. Thus, between the measuring points on premolars and molars, there were 14,74± 0,07 and 20,49± 0,11 mm, and their mean values were 6,69± 0,47 and -6,58± 0,43 mm respectively, which also had significant differences in comparison with data of average severity (P<0,05).

The data of the biometric measurements results determine the maxilla constrictions due to the hard palate vault height at different degrees of CTD severity in children and adolescents. In addition, the use of the developed method in identifying local (organs and tissues of the oral cavity) CTD manifestations contributes to a more rapid adoption of comprehensive therapeutic and preventive actions to restore constrictions, maxillofacial anomalies and deformities of the upper jaw without complex clinical and diagnostic measures.

Pearson correlation analysis revealed the relationship between the gothic palate and bite disorder (r=0.81), changes in tooth position and dentition deformity (r=0.59). In addition, the relation presence between the gothic palate and upper jaw constriction in CTD among children and adolescents was confirmed by the results of factor analysis using the Varimax method.

Conclusion. We have obtained the results of measuring the maxilla constriction for the first time depending on the depth of the hard palate vault in schoolchildren with various CTD degrees. It forms the basis for timely planning and organization of comprehensive dental care improving the diagnosis, treatment and prevention of morphological maxilla deformities in this pathology, involving specialists in various fields.

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