ОРТОДОНТИЯ

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DIMENSIONS OF FRENUM AT TYPE I, TYPE II AND TYPE III SHORTENING

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РАЗМЕРЫ УЗДЕЧКИ ЯЗЫКА ПРИ I, II И III ВИДАХ ЕЁ УКОРОЧЕНИЯ

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There is a number of issues causing interest cyclically and over time due to the improvement of existing and development of new methods of diagnosis and treatment, they are once again the subject of study. This applies particularly to the tongue, the study of which attracts attention of both scholars and practitioners of various specialties, dentists in the first place [1-3].

Tongue is a mobile unpaired muscular organ involved in all functions, among which the most important ones are chewing, bolus formation, swallowing, and speech formation [4]. Inferior surface of tongue is only free in its frontal part; the tongue is connected with the mucosa of the alveolar process of the lower jaw through the fold of mucous membrane, known as tongue-tie. Tongue flexibility and movements are conditioned by the peculiarities of its structure and size. Orthodontists' interest in studying the tongue is determined by its effect on the formation of occlusion and functioning at normal length as well as with different types of shortening of its frenulum.

Shortening of the lingual frenum is a type of ankyloglossia (this term comes from the Greek words *agkilos* for crooked or loop and *glossa* for tongue. This pathology is considered a congenital anomaly of the attachment of soft tissues of the oral cavity [5-6]. After analyzing sources, we established that the shape and size of tongue were sufficiently studied by different authors [7-10], and the data concerning the size of tongue and lingual frenum at the most common types of its shortening in patients with dentofacial anomalies are limited and contradictory. Thus, ***the purpose*** of research is to evaluate the size of tongue-tie at the most common types of its shortening.

Materials and methods: The frenum size had been determined in 91 persons with physiological occlusion and without apparent shortening of frenum (control group), and in 259 patients with various dentofacial anomalies (DFA) and shortening of frenum (study group). The patients' ages ranged from 6 to 27 years. The participants of the study were divided into three age groups: group I consisted of patients with an early transitional dentition (6-9 years), group II included persons with late transitional dentition (10-14 years), and group III comprised of patients with permanent occlusion (older than 14 years).

Type of lingual frenum shortening (LFS) was determined by F. Horoshilkina method (2004) [11], the length of frenum was determined by G. Zolotukhina method (1999) [12].

Results and discussion: Survey of school-children in Poltava aged from 6 to 17 years showed that the prevalence of short frenum was in 42.48% of persons. LFS type I and II were detected in 15.04% and 15.49% of patients

Table 1

Comparison of vertical size of the lower lingual surface in patients with DFA and LFS and patients with normal occlusion

Type of frenum shortening	Vertical dimensions of lower lingual surface		
	Lingual height	Frenum length (from a top of attachment point to an efferent duct of salivary glands)	Distance from a tip of tongue to a top of attachment point of the frenum (free space)
1	2	3	4
I age group (6-9 years)			
LFS type I (n=30)	42.98±0.55***	22.76±0.93**	10.09±0.50***
LFS type II (n=35)	41.08±0.66**	16.77±0.78***	12.68±0.64
LFS type III (n=26)	39.99±0.67***	10.26±0.56***	20.38±0.45***
Normal (n=30)	45.39±0.64	25.42±0.85	13.28±0.48
II age group (10-14 years)			
LFS type I (n=33)	44.22±0.64***	22.96±0.98***	12.37±0.48
LFS type II (n=33)	43.25±0.89***	15.25±0.69***	18.55±0.65***
LFS type III (n=10)	43.95±0.57***	9.11±0.68***	21.35±0.46***
Normal (n=30)	47.25±0.89	26.42±0.57	13.78±0.58
III age group			
LFS type I (n=44)	47.30±0.56***	23.42±0.78***	13.31±0.36
LFS type II (n=34)	46.44±0.93***	16.44±0.83***	18.22±0.50***
LFS type III (n=14)	45.93±0.66***	10.88±0.88***	20.90±0.44***
Normal (n=31)	50.03±0.89	26.92±0.46	13.76±0.43

Notes: ** - p<0.05, ** - p<0.01, *** - p<0.001 - a statistically significant difference between the study group and the control group.*

respectively, LFS type III was found in 10.62% of children, and LFS type IV was in 1.33% of persons; LFS type V was not diagnosed. According to the data found in literature, the prevalence of LFS ranges from 3.2% to 50%.

LFS type I was diagnosed in 107 (41.31%), LFS type II was found in 102 (39.38%), LFS type III was in 50 (19.30%) of 259 surveyed orthodontic patients; LFS type IV and V were not detected. M. Kuznetsov [13] had diagnosed shortening type I in 35.5% of patients, shortening type II – in 24.0%, shortening type III in – 29.0%, shortening type IV – in 4.7%, and shortening type V – in 6.5% among the patients with different types of LFS who were supposed to undergo. Thus, our studies confirm the data from reviewed literature that the most common types of lingual frenum are shortening types I, II and III.

To determine the indications for frenuloplasty at frenulum shortening, it is important to study its dimensions in the age aspect. For frenuloplasty, it is necessary to measure three parameters of the lower lingual surface: the lingual height, the actual length of frenum and the distance from a tip of tongue to an upper attachment point of frenum (free space).

Comparison of frenum dimensions in orthodontic patients with LFS and in those with normal occlusion and without visible shortening of frenum depending on the age and type of

shortening showed **(Table 1)** that a statistically significant increase occurs in the lingual height in all age groups. An almost single-valued increase occurs in LFS types I and II: in the LFS type III, the largest increase occurs in the age of 10-14 years.

The length of frenum in both groups of patients with normal occlusion and orthodontic patients with LFS was increasing slightly. Free space (distance from a tip of tongue to a top of attachment point of the frenum) at LFS type I had increased in age aspect in average by 3.22 mm, at LFS type II, it had enlarged by 5.54 mm, and at LFS type III its dimension did not change.

The study showed that the average length of tongue-tie in patients with normal occlusion and without apparent shortening is 26.45 + 0.97 mm. The length of frenum is 23.05 + 0.81 mm in patients with DFA at the shortening type I, at the shortening type II, it is 16.15 mm + 0.73 mm, at the shortening type III, it amounts 10.8 + 0.62 mm. Thus, at the LFS type I, its length is by 3.40 mm shorter than in patients with normal occlusion and normal length of frenum, at the LFS type II, it is shorter by 9.95 mm, and at the shortening type III it is shorter by 16.37 mm.

Having analyzed the above-stated, it was concluded that patients with dentofacial anomalies and shortened lingual frenum should be also prescribed additionally to the appropriate orthodontic treatment:

– miogymnastics for stretching of frenum and if necessary for change of its position and movements without surgical intervention at the LFS type I,

– a one-stage frenuloplasty and miogymnastics for change of position and the range of lingual movements at the LFS type II,

– a two-stage frenuloplasty, miogymnastics for change of position and the range of lingual movements at the LFS type III.

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Резюме

РАЗМЕРЫ УЗДЕЧКИ ЯЗЫКА ПРИ I, II И III ВИДАХ ЕЕ УКОРОЧЕНИЯ
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В статье представлены результаты изучения размеров уздечки языка у 259 ортодонтических пациентов при наиболее часто встречающихся видах ее укорочения (I-III) в возрастном аспекте.

На основании измерения трех параметров нижней поверхности языка (высоты языка, собственно длины уздечки и расстояния от кончика языка до верхней точки прикрепления уздечки – свободного пространства), определены показания к проведению френулопластики.

Ключевые слова: уздечка языка, размеры уздечки, I-III виды укорочения уздечки, ортодонтические пациенты.

Abstract

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The article presents the study results of the size of lingual frenulum in 259 orthodontic patients at the most common types of its shortening (I-III) in the age aspect.

Based on the measurements of three parameters of the lower lingual surface (the lingual height, the actual length of frenum and the distance from a tip of tongue to an upper attachment point of frenum – free space), we determined the indications for frenuloplasty.

Keywords: frenulum, size of frenum, types I-III shortening, orthodontic patients.