

Speech Disorders In Children With The Deformation Of The Dentoalveolar System And Their Complex Treatment

R.N. Nigmatov, I.M.Nigmatova, F.A. Shamukhamedova, M.O.Nodirkhonova, U.M.Razzakov, R.A.Kholmurzaev, M.B.Aralov

Department of Orthodontics and Dental Prosthetics of the Tashkent State Dental Institute, Tashkent, Uzbekistan.

Abstract

The authors conducted logopedic and orthodontic inspection 2284 (from them 1115 boys and 1169 girls) children living in Tashkent, in the age of from 6 till 14 years. For revealing prevalence and interrelation of infringement pronunciation at children with anomaly and deformation dentition systems the technique of complex treatment (orthodontic and logopedic) children of a replaceable bite also is developed. For definition of the orthodontic and logopedic status of surveyed children carried out clinical researches and functional tests, and also, necessarily, anthropometrical measurements. By means of special functional tests spent the functional speech tests directed on definitions of normal or pathological character pronunciation. Carried out researches have allowed to reveal high enough prevalence dentition anomalies and deformations at 1496 children from 2284 (65,49 %), and at 824 (36,08 %) - defects pronunciation. Duly revealing, drawing up and carrying out of a comprehensive plan of treatment and preventive actions are the mortgage of successful elimination dentition anomalies and deformations dental of some at children. Only joint activity of experts of medical and pedagogical structures has allowed to eliminate in due time and effectively anatomic infringements in a structure of the bodies participating in an articulation, and to correct maxillofacial development of an organism of children as a whole.

Key words: dentoalveolar system, orthodontic and speech therapy, articulation process, dentoalveolar system, rotacism.

Introduction

Children with anatomical and functional disorders of the dentoalveolar system (DAS) have speech disorders that limit their communication with peers, make them unsociable and withdrawn, often causing ridicule from other children. At the same time, the child learns to read and write with difficulty, and later makes a large number of seemingly inexplicable and unmotivated mistakes in writing (which is called dyslexia and dysgraphia) [1,3,5,6,7,9].

The formation of a holistic idea of the mechanisms and structure of a combined defect, in which sound-producing disorders are combined with anatomical deformities of the articulatory apparatus, can be carried only taking into account the etiology of anomalies of the dentition, oral cavity and nasopharynx, as well as speech disorders.

The process of sound pronunciation is carried out by the energy (respiratory), generator (voice-forming), resonator (sound-forming) departments of the speech apparatus when regulated by the central nervous system [2,4,6,8]. In order for this process to be complete, the most accurate articulation movements are required. When conducting a diagnostic examination, much attention is paid to assessing the condition of the organs of the dentoalveolar system, oral and nasal cavities, identifying violations of physiological and speech respiration, voice-forming functions. According to

world statistics, the number of speech disorders in children and adolescents is growing, and therefore the urgency of this problem takes on a global nature.

The aim of this study is to identify the relationship between speech impairment in children with changeable bite and an anomaly and deformation of the dentoalveolar system and to develop a method of complex treatment (orthodontic and speech therapy).

Materials and methods

From 2014 to the present day, a speech therapy and orthodontic examination has been conducted for 2,284 children (including 1,115 boys and 1,169 girls) aged 6-14 living in Tashkent.

In order to determine the orthodontic and speech therapy status of the examined patients, clinical studies and functional tests were carried out, and anthropometric measurements were made if necessary. Special functional samples were used to study the features of the lower jaw dislocation (determining the direction and cause of dislocation), the functions of breathing, chewing, swallowing and speech functions (determining the general nature of sound pronunciation and the articulation process of the dentoalveolar system). When assessing speech function, functional speech tests were performed to determine the normal or pathological nature of sound reproduction. The examined child was asked to pronounce several sounds or syllables and the degree of bite separation and position of the tip of the tongue were monitored (10).

The study of speech function in children with speech disorders and anatomical deformities of the DAS organs were conducted using age-appropriate methods generally accepted in speech therapy. Speech therapy methods of research and treatment were carried out in cooperation with a speech therapist at secondary school No. 18 of Mirzo-Ulugbek district of Tashkent, while orthodontic treatment was carried out at the Orthodontics clinic of the Department of Orthodontics and Dental Prosthetics of the Tashkent State Dental Institute.

Results and discussion

The analysis of the results showed that the prevalence of anomalies and deformations in children with changeable bite is very high and according to our data is 65.49% (1,496 children). But, despite the high percentage of anomalies and deformities of teeth, dentition and bite, dental care, including orthodontic treatment, provides no more than 6.93% of these children.

Of all 1,496 children with detected dentoalveolar anomalies and deformities, 824 (36.08%), including 385 boys and 439 girls, have pronunciation defects due to anatomical defects in the articulation of the tooth-jaw system and myofunctional disorders.

All 824 children were divided by us into 3 conditional groups. The 1st group (main group) consisted of 275 children (129 boys and 146 girls) with dentoalveolar anomalies and deformities, as well as speech disorders, who underwent comprehensive orthodontic and speech therapy. The 2nd (orthodontic) group includes 294 children (136 boys and 158 girls) with dentoalveolar anomalies and deformities who received only orthodontic treatment. The 3rd (speech therapy) group included 255 children (119 boys and 136 girls) with dental jaw system anomalies and deformities, as well as speech disorders, in whom only speech therapy was performed (Table 1).

Table 1

Distribution of children in the three groups according to age, abc. (%)

Age, years	Total number of children	Main group (complex treatment)		Orthodontic group		Speech therapy group	
		Total	b/g	Total	b/g	Total	b/g

6-9	520 (63,1)	158 (19,2)	82 (10,0)/ 76 (9,2)	183 (22,2)	87 (10,6)/ 96 (11,6)	179 (21,7)	84 (10,2)/ 95 (11,5)
10-14	304 (36,9)	117 (14,2)	48 (5,8)/ 69 (8,4)	111 (13,5)	49 (5,9)/ 62 (7,6)	76 (9,2)	35 (4,2)/ 41 (5,0)
Итого	824 (100)	275 (33,4)	130 (15,8)/ 145 (17,6)	294 (35,7)	136 (16,5)/ 158 (19,2)	255 (30,9)	119 (14,4)/ 136 (16,5)

Note. b - boys, g - girls.

Our observation showed that crowding of teeth and dentition was diagnosed in 110 observed patients, tooth transposition - in 84, tremas between teeth - in 63, diastema - in 68, tortoanomaly - in 53, secondary adentia - in 149, early removal of milk teeth - in 122, narrowing of the dental arch - in 44, shortened frenum of the tongue - in 45, shortened upper lip frenum - in 42, lower lip - in 18.

Out of the 824 children with identified dentistry anomalies and deformities with sound pronunciation defects, prognathic bite was observed in 182 (22.09%), prognathic bite – in 165 (20.02%), deep bite – in 108 (13.11%), open bite – in 85 (10.31%), cross bite – in 98 (11.89%).

A significant number of the examined patients had a combination of anomalies and position of teeth with bite pathology, as well as several types of bite anomalies simultaneously.

The study showed that children with anomalies and deformities of the DAS were characterized by a slight decrease in articulation clarity, which did not affect the overall speech intelligibility. Violations of sound reproduction were manifested in distortions of individual sounds and groups of sounds. All children with pathology of teeth, dentition and bite had different types of rotacism (uvular, posterior-lingual fricative pronunciation).

Out of 182 children with a removable bite, the location of hissing sounds was disturbed in the presence of a prognathic bite. The pronunciation of lip-nose (n, b, m), mouth-toothed (f, v) and anterior blasting (t, d) letters was quite common with this pathology.

The pronunciation of whistling and hissing sounds, pronounced as interdental sounds, was disturbed in 65 children with a prognathic bite. The antilingual sounds of the explosion were softer.

In 108 children with a deep bite, tooth sigmatism was observed, when the hissing, whistling sounds and affricate sounds were pronounced as anterior blast sounds (t, d) instead of hissing, whistling and affricate.

In 85 children with an open bite, the pronunciation of whistling, hissing and affricate sounds was disturbed and pronounced as interdental sounds.

In 98 children with cross-bite, sound pronunciation defects resulted in side sigmatism. The side edges of the tongue were not adjacent to the root teeth, and the air jet did not go through the middle line of the tongue, but through the side slot.

The shortened bridle of the tongue in 45 children made it difficult for the tongue to move up, right and left, and the pronunciation of the "r" sound was disturbed.

In 42 children with a shortened upper lip frenulum, the mobility of the upper lip and, as a result, the pronunciation of labial sounds was difficult.

In 18 children with a shortened frenulum of the lower lip, the pronunciation of lip and mouth sounds was impaired. In both cases, the labialised vowel sounds (o, u) lost their labialisation and sounded like approximations.

In 68 children, diastema and 149 adentia of even one tooth in the front area resulted in a hissing background when whistling sounds were pronounced, because the direction of the air jet was impaired. The adentia of two or more incisors determined the appearance of interdental sigmatism, with the tongue in the gap formed by a defective tooth row when pronouncing whistling and hissing sounds.

The principle of treatment in group 1 patients was orthodontic treatment with the elimination of anomalies and deformities of the dentition and muscle training, which contributed to the normalization of the function of the synergistic and antagonistic muscles. The effect of the treatment depended on the degree of morphological and functional disorders, patience and perseverance of children, and control over the quality of exercise. Speech therapy sessions were conducted individually and in groups (Table 2).

In 64 (7.76%) children, a plate with a bead was used to stimulate the language during classes with a speech therapist. A bead fixed to a wire held the tongue in a physiologically correct palate position.

Table 2

Type of treatment of dental anomalies and deformities with a sound reproduction defect

Group	Type of treatment	
	orthodontic	logopedic
1	Myogymnastics, trainers, myobrace system, chin sling, grinding of milk tubercles, removable plate devices	Massage of the hard and soft palate, gymnastics of articulatory and mimic muscles
2	Myogymnastics, trainers, myobrace system, chin sling, grinding of milk tubercles, removable plate devices	
3		Massage of the hard and soft palate, gymnastics of articulatory and mimic muscles

In 203 (24.64%) of children, the preorthodontic trainer T4K was used, since the trainer design provides a special tongue I for correcting the position of the tongue, which "reminds" the child of its correct position when swallowing and at rest. When touched, the tongue takes a physiologically correct palatal position in the oral cavity.

In 198 (24.03%) children, vestibular plates from Dr. Hinz Dental (Germany) were used, which are effective when the cause is due to dysfunction of the soft tissue involved in the articulation process.

Plates I with a red ring (22.5 mm radius) were used in the early shift bite, and II with a blue ring (30 mm radius) for children with a late shift bite. The Vestibular plates made it possible to transfer the child's oral breath to nasal, stimulated the tone of the circular muscle of the mouth and normalized the closing of the lips, contributing to the process of natural self-regulation. Due to the normalization of the function of the muscles of the maxillofacial region, the infantile type of swallowing was eliminated.

In 121 (14.68%) children with small defects in the dentition, prosthetics were performed with partial removable plate prostheses without clamp fixation or orthodontic appliances with artificial teeth.

Logopedic lessons with Group 1 children were strictly individual. This is due to various clinical manifestations of dental anomalies and deformities of the dentition. Classes were held 2-3 times a week for an average of 30-35 minutes, depending on the age of the child, with a mandatory dynamic pause.

The use of modern methods and means of prevention and the conduct of speech therapy classes together with a speech therapist has made it possible to reduce orthodontic treatment time. The average duration of treatment in Group 1 was 11±2.8 months, and in Group 2 - 15±3.1 months. No orthodontic treatment was conducted in Group 3.

Thus, prevention of dental deformities and myofunctional disorders – as well as speech disorders, is a set of measures aimed at preventing and eliminating etiological and pathogenetic factors that contribute to the occurrence of anomalies in the structure and functions of peripheral speech organs. The preventive nature of such measures is very important, since the prevention of anatomical defects at an early age and the correction of already formed deformities prevents disorders (imbalance) of the functions of not only the chewing, but also other physiological systems of the human body, and contributes to the better development of children's speech.

Thus, when conducting a survey of children in Tashkent aged 6-14 years, a fairly high prevalence of dental anomalies and deformities was revealed: for example, anomalies and deformities of the ES were diagnosed in 1496 (65.49%) of the 2284 examined, defects in sound reproduction were found in 824 (55.08%).

Timely identification, preparation and implementation of a comprehensive treatment plan and preventive measures are key to the successful elimination of tooth anomalies and deformities in children.

The data obtained should be taken into account by orthodontists and speech therapists in the construction of correctional and pedagogical work. Only the joint work of medical and pedagogical specialists will allow timely and effective elimination of anatomical disorders in the structure of organs involved in articulation and correction of maxillofacial development in children as a whole.

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