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Methods of Examination of Patients With Distal Occlusion of the Dentition Caused by Jaw Anomalies

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Relevance of the study. The most common of all forms of maxillary anomalies is distal occlusion caused by jaw anomalies, which occurs in 13-27% of the examined patients and is an indication for combined treatment with surgery, as a result of which the position of both bone and soft tissue structures changes. These patients have significant anatomical and functional changes. Anatomical disorders are eliminated during orthognathic surgery. Functional - they are corrected conservatively and are a common cause of relapses. The authors found that distal occlusion is often accompanied by pathology of the temporomandibular joint and imbalance of the muscles of the maxillofacial region. In patients with distal occlusion of the dentition, the biopotentials of all muscles of the maxillofacial region are elevated at rest, which indicates their hypertension. There is evidence that with distal occlusion of the dentition, sagittal and transversal movements of the lower jaw are difficult. The effectiveness of chewing decreases both during biting off food and chewing it. Previous studies have made it possible to fully identify all kinds of disorders, mainly in patients with the dental alveolar form of distal occlusion, and much work has been devoted to childhood. The pronounced values of the parameters before combined treatment during functional diagnostic methods in patients with distal occlusion of the dentition caused by jaw anomalies, in contrast to the indicators in patients with dental alveolar forms, made it necessary to conduct an examination of this group after treatment and determine the degree of recovery of indicators and, accordingly, the functional state of the maxillofacial region. It also allows us to determine the need to explore additional treatment methods necessary for complete rehabilitation. Distal occlusion caused by jaw anomalies ranks first among other anomalies of the maxillary system and occurs in 13-27% of the examined patients. Based on a study conducted in Belgium, the ratio between class I, II and III skeletal malformations of the jaws was found to be 31, 52 and 11.6%, respectively (Willems G. et al., 2001). According to F.Y. Khoroshilkina (2000), this form of pathology, like other types of dental anomalies, occurs at all ages of human life. Distal occlusion is usually combined with and complicated by deformations of the facial skull, characterized by a violation of the morphofunctional relationships of its elements and their aesthetic proportions. Distal occlusion can form at the level of the jaws (gnatic shapes) and dentition. In addition to the genetic features of development, the role of disorders of the muscular system leading to secondary deformations in bone structures is considered as the cause of the development of distal occlusion. The facial musculature can have a twofold effect on jaw growth: firstly, bone formation at the muscle attachment site depends on muscle activity; secondly, muscles are an important part of the entire tissue base, the growth of which usually moves the jaws. Most often, changes in the muscles of the CHLO are caused by prolonged improper function. As a result, hyperfunction is noted in some muscle groups, and hypofunction in others, which causes significant changes in both those and other muscles in the form of compensatory and adaptive deformation, characterized by a restructuring of fiber composition, metabolism and contractile properties. Distal occlusion of the dentition is significantly affected by functional disorders in the form of a violation of the myodynamic balance in the teeth. Distel V.A., Suntsov V.G., Khudorozhkov Yu.G. (2001) also believe that functional disorders are one of the most important causes of the development of maxillary anomalies and deformities. Artificial feeding, decreased chewing function in case of carious destruction of temporary and permanent teeth, bad habits (sucking pacifiers, fingers, etc.) contribute to the development of distal occlusion of the dentition. Bad habits lead to increased training of some muscle groups due to the weakening of the action of others. Impaired nasal breathing, the effects of otitis media, chronic hypertrophiing tonsillitis and adenoids affect the function of mouth closure, the development and

growth of the temporomandibular joint, the position of the tongue in the oral cavity and, ultimately, the myodynamic balance of the muscles of the jaw. Disruption of the interaction of the muscles of the tongue, cheeks and lips is the trigger mechanism for changing the direction of jaw growth.

In patients with distal occlusion of the dentition caused by jaw anomalies, the motivation for combined treatment was a violation of facial aesthetics (60%), dental position (71%), and function (30%). Hypertonia and parafunctions (bruxism) of the masticatory muscles contribute to functional overload, which causes prolonged non-functional sliding movements of the lower jaw relative to the upper with closed dentition. Various deformations of the dentition in distal occlusion are always accompanied by functional overload of the teeth, impaired function of the temporomandibular joint and affect the functional state of the muscles of the jaw. Functional disorders with distal occlusion of the dentition were detected in 63-89% of the examined patients. So, in their work, Castagno E.B. et al. (2019) when examining muscles in patients with distal occlusion of the dentition caused by jaw anomalies, using modern diagnostic methods, significant differences in muscle biopotentials were revealed when compared with the norm. The frequency and severity of functional disorders increase from 15 to 45 years of age. Women suffer from dental and maxillofacial disorders much more often than men. The gender ratio of prevalence, according to various authors, ranges from 1:3 to 1:9. The prevalence of various manifestations of dental disorders is: muscular disorders - about 23%, articular disorders - about 19%, a combination of articular and muscular disorders - about 27% and about 31% of the population have no signs of dental disorders. Many researchers have identified significant functional impairments in patients with distal occlusion of the dentition. Thus, Klimova T.V. (2010), conducting kinesiography studies, found violations of the biomechanics of lower jaw movement in individuals with distal occlusion aged 13-15 years during all functional tests. Nabiev N.V. (2011) during electromyographic examination of patients 13-15 years old with distal occlusion found an increase in the biopotentials of all masticatory muscles at rest, which indicates hypertension. Castagno E.B., Klimova T.V. et al. (2012) functional examination of adult patients with distal occlusion caused by jaw abnormalities revealed a significant increase in the biopotentials of all muscles compared with patients with the dental alveolar form of distal occlusion. In their work, Drobysheva N.S. et al. (2019) in a kinesiographic study of adult patients with distal occlusion of the dentition caused by jaw anomalies, significant differences were found with the norm, as well as differences in the angles of onset of movement in patients with vertical and horizontal types of facial skull structure. It should be emphasized that violations of the functional activity of the masticatory muscles persist even after the elimination of occlusion anomalies during orthotic treatment. That is, the normalization of the reflex activity of the masticatory muscles occurs extremely slowly and requires a restructuring of the activity of all elements of the reflex arc. The cause of muscle soreness in the neck and headache is often caused by orthodontic or orthopedic treatment. Pain is also observed in the temples, the temporomandibular joint, and in the depths of the eye sockets. As a rule, patients do not associate the appearance of these pains with previous prosthetics or orthodontic treatment and relieve pain with painkillers, which, as a rule, do not always help. After the soreness begins to increase, side effects of chronic pain such as dizziness, tinnitus, irritability, and depression join (Homan M.V. et al., 2012). In patients with the correct alignment of the jaws, the lower jaw, in combination with the muscles, is a counterweight to the entire body. When this correspondence is violated, not only the muscles supporting the lower jaw are strained, but also the muscles of the entire body as a whole. Afterwards there is a violation of the symmetry of the skeleton. In this case, there is only one way to relieve muscle pain and eliminate postural disorders: to bring occlusion back to normal (Trezdubov V.N., 2005). Distal occlusion is characterized by structural and functional changes in the area of the temporomandibular joint, which are due to its close relationship with the neuromuscular apparatus of the dental system and the nature of the closure of teeth.

Many authors have noted a correlation between the depth of the articular fossa, the shape of the articular head and occlusion (Bulanova T.V., 2005). With distal occlusion, under the influence of constant functional loads, conditions are created for the occurrence of traumatic compression, as a result of which the articular head of the lower jaw sinks into the underlying tissues, the transverse

dimensions of the articulating surfaces of the articular process increase, and the growth in length practically stops (Ronkin K., 2006). According to Cardenas N. et al. (2002), the lateral pterygoid, temporal and masticatory muscles may interact with the articular disc through muscular or connective tissue fibers, as well as these muscles affect the displacement of the disc during movements of the mandible, while the size and shape of the muscle passages are the subject of a large number of individual variations. According to McNeil C. (1997), the articular disc is the first to react to any impact, acting as a volumetric compensatory mechanism for uniform pressure distribution. The long-term existence of occlusal disharmony contributes to the displacement of articular heads and the appearance of non-functional loads, which can lead to injury to articular tissues, changes in the shape and anatomical and topographic relationships of the structural elements of the temporomandibular joints. Thus, distal occlusion is characterized by a change in the position of the articular head of the lower jaw, resulting in increased pressure on the central and upper regions of the articular cavity, which leads to their resorption (Okeson J.P., 2005). Khudonogova E.Ya. in 2006, in her dissertation, she determined that disorders of the musculoskeletal system in the gnatic form of distal occlusion of the dentition are more pronounced than in the dentoalveolar form, namely, anterior displacement of the head is 9.1 times more common, chin is 6.9 times more common; an increase in thoracic kyphosis is 4.3 times more common. Lumbar lordosis is 2.3 times more common; hip dislocation is 12 times more common.

Conclusion. Asymmetry of the shoulder blades is 12.5 times more common, and thoracobrachial angles are 8 times more common. An electromyographic examination before the start of orthodontic treatment showed an increase in the bioelectric activity of the masticatory muscles at rest in 35 of 39 patients with gnatic distal occlusion of the dentition, and an asymmetry of the average amplitude of the biopotential of the masticatory muscles of the right and left sides was determined. In 10% of cases, patients with gnatic distal occlusion showed signs of muscle hypertonia. An analysis of the literature data suggests that distal occlusion contributes to the development of various pathological conditions of the maxillary system, accompanied by a violation of the functional state of the temporomandibular joint, which, in turn, causes difficulties in correcting this anomaly and requires an integrated approach to treatment.

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