MORPHOFUNCTIONAL CHARACTERISTICS OF THE DENTOFACIAL SYSTEM IN CHILDREN WITH CROSSBITE AND THE DIAGNOSTIC VALUE OF FUNCTIONAL TESTS

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Abstract: This article examines the morphofunctional changes observed in the maxillofacial system of children with crossbite and highlights the importance of comprehensive diagnostic assessment. Crossbite is considered not only as an occlusal disorder but also as a condition that may affect jaw growth, facial symmetry, muscle balance, chewing function, swallowing, speech, and temporomandibular joint adaptation. The article emphasizes that early and accurate diagnosis is essential for preventing progressive dentofacial deformities and improving orthodontic treatment planning. A complex approach including clinical examination, occlusal analysis, dental arch assessment, functional tests, and additional diagnostic methods is proposed as an effective basis for identifying the severity and origin of crossbite in children.

Keywords: Crossbite, children, maxillofacial system, morphofunctional changes, orthodontic diagnosis, occlusion, jaw development, facial asymmetry, dental arch, functional assessment.

Crossbite in children is one of the important orthodontic problems that can significantly influence the growth and development of the maxillofacial system. This condition is characterized by an abnormal relationship between the upper and lower dental arches, in which one or more teeth of the upper jaw occlude inside the corresponding teeth of the lower jaw. Although crossbite may initially appear as a local occlusal disorder, in children it should be considered a complex developmental condition because it may affect the morphology of the jaws, facial symmetry, chewing function, muscular balance, and temporomandibular joint adaptation.

The period of childhood is a crucial stage for the formation of the dentoalveolar system and facial skeleton. During this stage, the bones of the maxillofacial region are still developing, the occlusion is being formed, and functional patterns such as chewing, swallowing, breathing, and speech are gradually stabilized. Any disturbance in occlusal relationships during this period may influence the direction of jaw growth and cause persistent morphological and functional changes. Therefore, early detection and comprehensive evaluation of crossbite in children are of great importance in pediatric dentistry and orthodontics.Morphological changes associated with crossbite may include narrowing of the maxillary dental arch, asymmetry of the upper and lower jaws, deviation of the mandibular midline, irregular tooth position, impaired occlusal contacts, and disproportion in the development of facial structures. In some children, crossbite may also be accompanied by compensatory mandibular displacement, which can later lead to stable skeletal asymmetry if not corrected in time. These changes may negatively affect the harmony of facial growth and create conditions for more severe dentofacial deformities in adolescence and adulthood.

Functional disorders are another important aspect of crossbite. Children with this malocclusion may experience difficulties in proper chewing, uneven distribution of masticatory load, excessive strain on certain muscle groups, impaired coordination of mandibular movements, and changes in the function of the temporomandibular joint. In addition, crossbite may influence speech articulation, swallowing patterns, and nasal or oral breathing habits. Thus, the evaluation of crossbite should not be limited only to the position of teeth, but should also include the analysis of functional disturbances in the entire face-jaw system.

In clinical practice, the diagnosis of crossbite is often based on visual examination of occlusion and dental arch relationships. However, such an approach may not fully reveal the depth of morphofunctional changes occurring in the maxillofacial system. For this reason, there is a need for a comprehensive diagnostic approach that combines clinical examination, anthropometric measurements, occlusal analysis, functional assessment, radiographic evaluation, and, when necessary, modern digital diagnostic methods. Such an integrated approach allows specialists to determine not only the presence of crossbite but also its severity, origin, influence on jaw growth, and functional consequences.The scientific relevance of this topic is determined by the necessity to improve the early diagnosis of crossbite in children and to justify effective methods for the complex assessment of morphofunctional changes in the maxillofacial system. A detailed study of morphological and functional indicators can help to identify risk factors, predict the progression of dentofacial deformities, and develop individualized preventive and therapeutic measures. Early and accurate diagnosis is especially important because timely orthodontic intervention may prevent the transformation of functional disturbances into stable skeletal abnormalities.

Thus, the comprehensive assessment and diagnosis of morphofunctional changes in children with crossbite represent an important direction in modern pediatric orthodontics. The study of this problem makes it possible to better understand the relationship between occlusal disorders, jaw development, facial symmetry, muscular function, and temporomandibular adaptation. It also provides a scientific basis for improving diagnostic algorithms and increasing the effectiveness of early orthodontic care.The purpose of this research is to substantiate the methods of comprehensive assessment and diagnosis of morphofunctional changes in the maxillofacial system in children with crossbite. The achievement of this purpose will contribute to the development of a more accurate diagnostic approach, the prevention of progressive dentofacial deformities, and the improvement of treatment planning in pediatric orthodontic practice.

Crossbite in children is a complex orthodontic condition that affects both the structure and function of the maxillofacial system. Morphological changes may include narrowing of the upper dental arch, asymmetry of the jaws, deviation of the mandibular midline, irregular tooth position, and disturbed occlusal contacts. These changes can influence the normal growth of the facial skeleton and may lead to facial asymmetry if the condition is not diagnosed and treated in time. Therefore, crossbite should not be evaluated only as a dental problem, but as a disorder connected with the development of the entire face-jaw system.

Another important aspect of crossbite in children is its influence on the process of craniofacial growth. Since the maxillofacial system is actively developing during childhood, even minor occlusal disturbances may gradually affect the direction and harmony of jaw formation. Crossbite may create an imbalance between the upper and lower jaws, leading to compensatory changes in tooth position, muscle activity, and mandibular movement. In this regard, early diagnosis is essential not only for identifying the existing malocclusion but also for preventing future complications. A comprehensive assessment makes it possible to determine whether the disorder is mainly dental, skeletal, functional, or combined, which is necessary for selecting the most appropriate treatment strategy.

Functional changes are also important in children with crossbite. The child may develop unilateral chewing, abnormal mandibular movements, muscle imbalance, speech difficulties, swallowing disorders, and changes in temporomandibular joint function. In some cases, the mandible shifts to one side during mouth closure in order to find a comfortable bite position. If this functional displacement continues for a long time, it may become stable and cause more serious dentofacial deformities. For this reason, the diagnosis of crossbite should include not only clinical examination of

the teeth but also assessment of chewing, breathing, swallowing, speech, muscle activity, and mandibular movements.

In conclusion, comprehensive assessment of morphofunctional changes in children with crossbite is necessary for accurate diagnosis and effective treatment planning. A complete diagnostic approach should include anamnesis, extraoral and intraoral examination, occlusal analysis, dental arch measurements, functional tests, and, when needed, radiographic or digital methods. Early and detailed diagnosis helps to identify the cause and severity of crossbite, prevent progressive jaw deformities, and support harmonious development of the maxillofacial system in children.

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