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Morphological Features of the Structure of the Face in Open Bite

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Abstract: *The results of epidemiological studies of dentoalveolar anomalies conducted in recent years have shown that the prevalence of open bite ranges from 0.9 to 7.5% and reaches 10.5% among all anomalies. Such a significant prevalence of the anomaly, including in adults, should be primarily associated with the difficulty of differential diagnosis of its forms and its correction in childhood. In addition, a number of clinicians consider open bite to be a hereditary disease. The results of a large number of studies indicate that the peak of clinical manifestations of this anomaly occurs in adolescence and adulthood - 14-16 years and older. Nevertheless, in domestic and foreign literature, disorders of the masticatory -speech apparatus are considered mainly in children during the period of primary and mixed dentition.*

In addition, the works devoted to the diagnosis of open bite do not actually cover the issues of changes in the facial skeleton in this anomaly. At the same time, a detailed X-ray cephalometric characteristic of open bite will help to get closer to the pathogenesis of this disorder, and the identification of the main forms of the disease will allow for the correct planning of surgical or orthodontic treatment. Most of the known methods for analyzing profile teleradiograms of the head have shortcomings associated with the lack of consideration of individual features of the facial skeleton structure, or with the impossibility of accurately localizing the abnormalities in the size and position of each jaw. The latter is especially important when planning reconstructive surgeries [1.3.5.7.9].

Keywords: Morphological Features, Facial Structure, Open Bite, Cephalometric Analysis, Diagnosis, Treatment Planning, Orthodontic Treatment

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Introduction

The results of epidemiological studies of dentoalveolar anomalies conducted in recent years have shown that the prevalence of open bite ranges from 0.9 to 7.5% and reaches 10.5% among all anomalies. Such a significant prevalence of the anomaly, including in adults, should be primarily associated with the difficulty of differential diagnosis of its forms and its correction in childhood. In addition, a number of clinicians consider open bite to be a hereditary disease. The results of a large number of studies indicate that the peak of clinical manifestations of this anomaly occurs in adolescence and adulthood - 14-16 years and older. Nevertheless, in domestic and foreign literature, disorders of the masticatory -speech apparatus are considered mainly in children during the period of primary and mixed dentition.

In addition, the works devoted to the diagnosis of open bite do not actually cover the issues of changes in the facial skeleton in this anomaly. At the same time, a detailed X-ray cephalometric characteristic of open bite will help to get closer to the pathogenesis of this disorder, and the identification of the main forms of the disease will allow for the correct planning of surgical or orthodontic treatment. Most of the known methods for analyzing profile teleradiograms of the head have shortcomings associated with the lack of consideration of individual features of the facial skeleton structure, or with the impossibility of accurately localizing the abnormalities in the size and position of each jaw. The latter is especially important when planning reconstructive surgeries [1.3.5.7.9].

Thus, there is an urgent problem of developing and introducing into practice a method of X-ray cephalometric analysis of profile teleradiograms of the head of patients with open bite, allowing for an exhaustive study of the face, making a morphologically refined diagnosis, localizing the anomaly, and, consequently, making a correct treatment plan. This method should include a large number of parameters sufficient to make a diagnosis. Therefore, there is an inevitable urgent need to automate the process of processing teleradiograms.

In connection with the above, the objective of this study is to develop a refined and supplemented technique for X-ray cephalometric analysis of the facial skeleton to improve the quality of differential diagnostics and treatment planning for open bite in adults. The developed technique for X-ray cephalometric analysis of the face of patients with open bite formed the basis for the algorithm of the computer program for analyzing profile TRGs of the skull created and implemented in clinical practice. Its application helps to reduce the time spent on decoding lateral TRGs by eighty times. Its implementation is possible by mid-level medical personnel (X-ray technicians, nurses) with any IBM-compatible computer and appropriate special training. The program allows creating a database and saving the calculation results, and, if necessary, returning to them at any stage of orthodontic , surgical or prosthetic treatment. Treatment of open bite in adults has its own characteristics. It is longer than in children, and relapses occur more often. All this is due to the fact that the facial skeleton has already completed its formation, the jaw bone tissue is already difficult to rebuild during orthodontic treatment. Such patients are often shown complex treatment with preliminary compact osteotomy (surgical intervention before installing orthodontic equipment reduces bone strength and increases its plasticity) [2.4.6.8.10].

Recently, braces have been increasingly used as orthodontic treatment for open bite HYPERLINK "https://best-stom.ru/uslugi/detskaya-stomatologiya/brekety-dlya-deteh/". With open bite, even in children, teeth are often very closely spaced, and there is a lack of space. Brace systems allow you to correct the position of the teeth and perform orthodontic treatment without prior tooth extraction.

The bracket technique is a progressive method for correcting open bite. It allows for careful control over the process of tooth movement, but there are some peculiarities when using it: increased attention should be paid to oral hygiene, and frequent adjustments by the doctor are also necessary. The patient receives information about the time of wearing braces and the frequency of adjustments for open bite from the orthodontist. An alternative to brace therapy can sometimes be treatment with transparent caps or aligners. Aligners are a removable structure made of transparent biopolymer, each of which contains micro-movement of the tooth. The cap is worn 24 hours a day, removed only for eating and brushing teeth, and replaced with a new one every 2 weeks [11.13.14].

The proposed open bite systematization allows to characterize the localization of the anomaly quite accurately, to identify the main pathogenetic link of the disorder, to clarify the differential diagnostics, and, consequently, to correctly draw up a treatment plan. It uses 47 anthropometric points, 17 cephalometric planes, 62 angular and 35 linear measurements, as well as 15 relationships of linear quantities. The analysis technique implies a logical complex use of mutually confirming and mutually exclusive parameters, which improves the quality of differential diagnostics of open bite and other dentoalveolar anomalies and helps in setting the pathogenetic component of the diagnosis. In order to exclude errors in the diagnosis of dentoalveolar anomalies, as well as to significantly (80 times) reduce the time of a doctor's appointment, an ideological and formalized component of the computer system of X-ray cephalometric analysis has been created and introduced into practice, which allows for an automated entire chain of lateral teleroentgenogram research, including the formulation of a preliminary diagnosis [8.10.12.14].

An in-depth clinical and radiological anatomical study of 198 patients (79 men and 119 women) aged 16 to 37 years (average age 24 + 3 years) allowed us to develop a more precise classification of various forms of open bite in adults, intended for clinical use (in differential diagnostics and planning medical tactics). The created classification identifies various forms of open bite in adults. At the same time, only in 2.02% of cases this anomaly was independent and leading, and in 97.98% open bite was a syndrome of other anomalies or was part of a combination and combination with other dentoalveolar anomalies.

It has been proven that syndromic forms of open bite occur significantly more often than independent nosological forms, and the most common combinations are combinations of open bite in the anterior section with mesial ratio of dental arches (62.12%). At the same time, independent open bite is an exception to the rules of pathogenesis of the development of this anomaly. It was found that with open bite, deviations are noted both in the size and position of the jaws in the skull. The frequency of these combinations was revealed. Thus, with open bite, lower micro- and retrognathia (16.67%) and upper micrognathia (16.16%) occur with approximately the same frequency. It was found that syndromic forms of open bite can be a consequence of or accompany violations of the size and position of the apical bases. Thus, the frequency of such combinations with a distal ratio of dental arches is 16.07%, with a mesial one - 30.07%. The cephalometric parameters obtained as a result of the study in patients with open bite provided the opportunity to develop an algorithm for choosing therapeutic measures aimed at rehabilitating patients with open bite. The use of the proposed pathogenetic systematization will make it possible to conduct a more accurate differential diagnosis of various forms of open bite.

Conclusion. The use of the X-ray cephalometric analysis method developed by us using a set of mutually complementary and mutually exclusive parameters allows us to clarify the diagnosis of various forms of open bite, determine the main localization of the disorder, and, consequently, develop adequate medical tactics for correcting the anomaly in question..

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