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Cephalometric characteristics of the facial skeleton and skull base in children with diseases of the ENT organs with mesial and distal occlusion

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Abstract: Teleradiography is the most informative method for analyzing individual features of the structure of the facial and cerebral skull. With the introduction in 1934 of Hofrath in Germany and Broadbent in the US of x-ray cephalometry, a clinical tool for the study of anomalies of occlusion and skeletal disproportions appeared in the hands of scientists. The main goal of cephalometry is to study the model of craniofacial complex growth. The orthodontist needs to know how the basic functional components of the face (the base of the skull, jaws, teeth) relate to each other. Any anomaly is the result of the interaction of the position of the jaw and the position of the teeth after eruption, which is affected by the jaw ratio. At the same time, until now, cephalometric analysis was based, as a rule, on the nosological approach to the obtained data without taking into account the influence of etiological factors. Such an approach, in our opinion, negates the role of various factors in the violation of the growth and development of skull bones, excludes the possibility of elucidating the pathogenesis of the formation of one or another anomaly

Key words: Diseases of the ENT organs, morphological and aesthetic disorders of the dento-jaw system, replaceable and permanent bite.

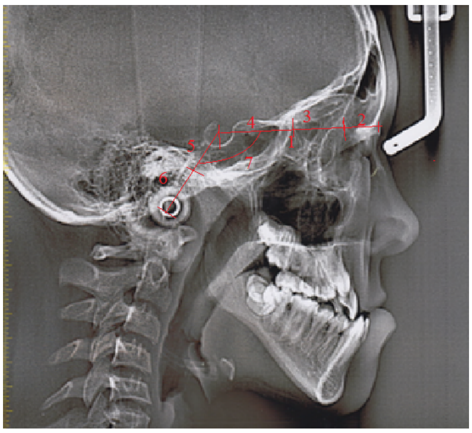
Purpose of the study. To clarify the morphological and aesthetic disorders of the dento-jaw system, the head was radar-imaged in the lateral projection in persons aged 7 to 23 years, divided into 2 groups: group 1-patients with diseases of the ENT organs and a disruption of nasal breathing; control group - persons who do not have violations of ENT organs. In addition, two subgroups were distinguished: with a removable and permanent bite. In patients with adenoids, there is a delay in the growth of the base of the skull, as well as the body of the upper jaw and the entire middle zone of the face. In addition, proportions in the development of the lower jaw are violated, which is manifested by a more pronounced growth of its branch with a simultaneous increase in the mandibular angle.

Methods of research. In order to clarify the diagnosis and substantiate the treatment plan, the telediography of the head in the lateral projection was performed in 96 patients aged 7 to 23 years. The main group consisted of 62 people who had adenoids and other chronic diseases of ENT organs with a history of persistent nasal breathing disorder in the history or at the time of the examination. The control group included 34 patients who did not have diseases of the nasal cavity and nasopharynx. Each group in turn was divided into 2 subgroups depending on the nature of the occlusion: removable or permanent.

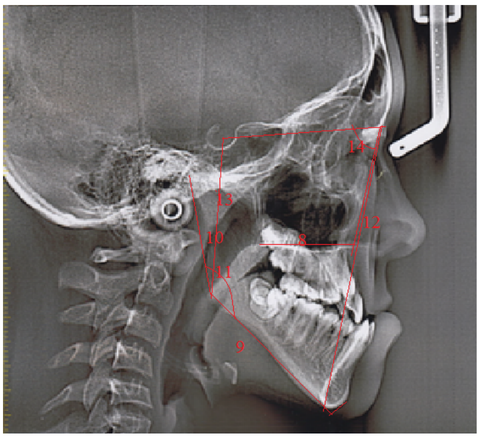
We took into account 24 cephalometric parameters characterizing the longitudinal dimensions of the bones of the skull base (palatine, lattice, main), the length and location of its vertical dimensions, as well as the longitudinal dimensions of the jaws and their location in the skull. When assessing the position of bones in the sagittal plane, the corresponding anatomical points were projected onto the plane of the anterior part of the base of the skull due to the great variability in the location of the Frankfurt horizontal.

The main cephalometric parameters are presented in the table, from which it follows that during the period of the replaceable occlusion, the parameters of the base of the skull in children with adenoids do not have statistically significant differences from those of the control group, although the tendency to decrease the length of the anterior part of the skull base and increase the angle of its inclination is determined.

In the period of permanent bite in persons with adenoids, the length of both the anterior and posterior bases of the skull is smaller than in the control (Figure a), and the angle of its inclination is greater than in the patients of the control group.



a



b

Fig. A. Parameters of the cerebral part of the skull: 1 - length of anterior part of the skull base (N-Se); 2 - length of the frontal bone (N-Et); 3 - length of the lattice bone (Et-Sph); 4 - length of anterior part of the main bone (Sph-Se); 5 - length of the posterior part of the base bone (SphO-Se); 6 - length of the posterior part of the base bone (Se-Ba); 7 - angle of inclination of the base of the skull (<NSeBa).

Fig. B. Parameters of the facial part of the skull: 8 - length of the base of the body of the upper jaw (A-Snp); 9 - length of the base of the body of the lower jaw (Pg-Go); 10 - length of the mandible branch (Go-Ar); 11 - the angle of the lower jaw (Pg-Go <Go-Ar); 12 - height of the facial skeleton in the anterior part (N-Me); 13 - height of the facial skeleton in the back (Se-Go); 14 - position of the upper jaw in the sagittal plane (Se-N <A).

Changes in the size of the anterior part of the base of the skull from the change of teeth to the formed permanent occlusion are observed in patients of both groups, with an increase only as a result of an increase in the length of the frontal bone. The dimensions of the latticed bone and the anterior part of the body of the basal bone vary insignificantly. In addition, in the control group, there is an increase in the length of the posterior part of the base of the skull due to lengthening of the distal part of the body of the underlying bone, which does not occur in persons with adenoids.

Significant differences are revealed in the parameters characterizing the middle zone of the facial skeleton. Thus, regardless of age in patients with adenoids, the length of the base of the body of the maxilla is reduced, the facial angle is reduced, which indicates the distal position of the jaw in relation to the base of the skull. In addition, in the constant bite in comparison with the period of the change of teeth, the size of the apical base of the maxilla in patients of both groups decreases, and this decrease in persons with adenoids is statistically more significant than in the control group (Fig. b).

The reason for the shortening of the apical base in a constant bite, more pronounced in individuals with adenoids, is a shortening of the upper dentition due to the mesial displacement of the lateral teeth. This is evidenced by a significant increase with age of the distance of the distal surface of the first permanent molars to the posterior nasal awn, as well as a negative correlation of the mean force between this parameter and the length of the apical base. From an interchangeable to a permanent bite, the vertical dimensions of the upper jaw body and the height of the middle zone of the facial skeleton increase, which is more pronounced in the control group (with the exception of the anterior height of the upper jaw body).

The dimensions of the body and the mandibular branch in the temporary bite in children with adenoids are less than in the control group, and the temporomandibular joints are located lower.

During the period of permanent bite, in comparison with the change in occlusion, both the groups examined significantly increase the body and the mandibular branch, and the size of the jaw body in the control group is significantly higher than in patients with adenoids. It is important to note that the increase in parameters in patients of both groups is greater than the increase in the length of the base of the body of the upper jaw, which leads to an increase in the disproportion in the size of the jaws and the degree of their sagittal inconsistency. In addition, in patients with adenoids compared to the control group, the length of the branch increases significantly more than the body height, whereas in the control group, the increase in body size and branch is more uniform.

The location of the distal part of the body of the lower jaw and articular head relative to the Turkish saddle in the sagittal plane with age in both groups varies insignificantly.

The study of correlation links showed that in persons with adenoids in the period of the change of teeth, the length of the body of the upper jaw is characterized by weak connections (r = 0.30) only with the length of the posterior part of the base of the skull, and in the period of permanent bite this parameter has medium positive connections with the length of the anterior the skull base of the frontal bone and the anterior part of the body of the main bone (r = 0.39-0.54).

In the control group, the length of the base of the upper jaw body during the change of teeth positively correlates with the length of the anterior and posterior parts of the skull base (r = 0.52 and r = 0.64, respectively), and in constant bite the value of these bonds is r = 0 , 50 and r = 0.35.

The correlations of the anterior height of the upper jaw body with the parameters of the skull base in patients with adenoids are weak or absent, whereas in the control group there is an average positive relationshi p of this parameter with the length of the anterior part of the base of the skull (the value of the connection during the change of teeth is r = 0.46, in a constant bite r = -0.68).

The posterior body height of the maxilla in adenoids does not correlate with the size of the anterior and posterior parts of the skull base, whereas in the control group these parameters regardless of age have medium positive connections with all parameters of the base of the skull except for the angle of its inclination (the value of the bonds from r = 0, 34 to r = 0.53). Correlation connections of the vertical dimensions of the middle zone of the facial skeleton with the length of the anterior part of the base of the skull in persons with adenoids are weak or absent, and in the control group they are estimated as mean (r = 0.35). At the same time, patients of both groups had positive average connections of the vertical dimensions of the face with the length of the posterior part of the base of the skull.

Results of the study. When analyzing the effect of adenoids on the formation of dentoalveolar anomalies, most authors have in mind only a volumetric increase in adenoid tissue with negative consequences for the function of nasal breathing and do not take into account the fact that this tissue is often in a state of acute or chronic inflammation, representing a dangerous common and local allergies. It is logical to assume that the existence of this focus of inflammation in the immediate vicinity of the most important zones of growth of the cerebral and facial skeleton (cartilaginous formations of the primary nasal capsule, base-lattice and base-occi pital synchondrosis) can not be indifferent to the growth processes occurring in these zones.

It is appropriate in this connection to refer to the opinion of S.I. Krishtaba that compression and underdevelopment of the upper jaw are only very indirectly associated with the lack of nasal breathing. They arise only when the growth of the Valdeier ring and hyperplasia of the nasal concha are accompanied by a chronic inflammation of the nasopharynx, and zones of increased opposition activity are involved in the inflammatory process in the first place.

Our studies showed that in persons with progenic bite who have (or had had before) adenoids, the growth of the base of the skull, as well as the body of the upper jaw and the entire middle zone of the face (retrognathy) is delayed. In addition, the harmony of the development of the lower jaw is disturbed, which is manifested by a large development of the mandible as a result of a more pronounced growth of its branch with a simultaneous increase in the mandibular angle. The character of the correlation of different cephalometric parameters changes.

In our opinion, not only the decrease in the posterior body height of the maxilla in children with adenoids deserves attention, but also the absence of correlations between this parameter and the length of the anterior part of the base of the skull, since the underdevelopment of the distal vertical sections of the upper jaw is the result of the lack of stimulating influence of the cartilaginous structures of the septum on the development of the middle part of the face.

Thus, the formation of mesial occlusion in patients with adenoids can be considered as a result of disruption of growth processes in the suture joints of the base of the skull and in the cartilaginous formations of the primary nasal capsule due to the long existence of a focus of chronic inflammation in the nasopharynx.

Conclusions. Consequently, it can be argued that the restoration of nasal breathing does not completely solve the problem of treating this category of patients. Since adenoids are most common in children from 3 to 7 years old, and at this age there is active growth of the facial skeleton, it is important to early detect and prevent diseases of the nasal cavity and nasopharynx. The increase in the incidence of chronic diseases of the ENT organs in childhood in the last two decades, the risk of developing congenital hypertrophy of the lymphadenoid tissue of the nasopharynx in a child in the pathological course of pregnancy and childbirth in the mother put forward as priority tasks the improvement of integration of pediatric dentists (orthodontists) in organizing primary prevention dentofacial anomalies caused by chronic diseases of the nasopharynx.

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