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Physiological and Pathological Aspects of Teeth Cutting and Formation of Bits in Children (Literature Review)

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Abstract The article provides an overview of the literature of domestic and foreign researchers of recent years on the study of the physiological and pathological aspects of teething and the formation of occlusion in children. The age and regional features of teething, factors leading to the development of pathology are described in detail. Methods for early diagnosis of teething pathology and bite formation in children are described.

Keywords Teething, Bite formation, Children, Dentition, Dentition pathology

1. Introduction

Teething is a physiological stage process, characterized by the appearance of milk, then permanent teeth in children. Teething is its axial movement from a non-functional position in the jaw bone to functional occlusion. The dynamics of this process depends on the degree of formation of the root, periodontal and is closely related to the development and growth of the craniofacial complex.

Impact and aneruption are classified depending on the existing mechanism of teething delay: impact (impact) is a teething delay associated with the presence of a mechanical obstruction. The cause of this pathology may be a lack of space in the dentition due to crowding, the presence of a mucous barrier, supernumerary teeth, and others; aneruption (aneruption - the absence of eruption, lack of eruption) is the primary violation of the process of eruption of non-ankylosed teeth with complete or partial lack of growth [20].

It is known that dental embryos appear in the fetus at about 6 weeks of fetal life. For another 1.5 months, the process of mineralization of bone tissue occurs. During this period (up to 13 weeks of pregnancy), the fetus takes calcium, phosphorus, protein, and other substances from its mother's body [10,26,36]. In this period, various diseases, malnutrition, a woman taking certain medications (for example, antibiotics of the tetracycline group) cause abnormalities in the fetus of the number and shape of dental crowns, disrupt the strength and color of their enamel.

At the time of birth, the crowns of 20 milk teeth are located deep in the alveolar processes of the jaws in a fully formed state. The process of their eruption is a kind of gradual increase in their volume and pushing out, in which they overcome the resistance of bone tissue, mucous membrane. At this time, the gums become swollen and sensitive [13,27].

The teeth erupt in a certain sequence, the eruption order is violated in some diseases: rickets; genetic syndromes; lack of bookmarks of the tooth buds as a result of the complicated course of pregnancy; endocrine pathology [21,47].

Zakharova I.N. et al. [18] consider that various factors influence teething. The main importance in the process of teething is the human genotype, its constitution, and the role of various external environmental factors cannot be ruled out. The authors suggest that children of elderly parents erupt earlier than children of young parents. In the first-born, teeth begin to erupt earlier than in the second and third children, in girls earlier than in boys, there is a direct correlation between the degree of prematurity of the child and the timing of teething. Features of the course of pregnancy in the mother also affect the physiology of teething.

Violations of the processes of teething and tooth change can be noted in the pathology of the pituitary gland, refusal from breastfeeding, frequent acute respiratory diseases, pneumonia, newborn sepsis [19,29].

According to Yatsenko A.K. et al. [35] at the present stage, the study of age-gender and regional characteristics of teething of permanent teeth as an important indicator of biological maturity and children's health remains important. This is necessary when planning and implementing measures to prevent biological development disorders among the children's population. This is also what Vatlin A.G. and Chuchkov V.M. came to [11].

Arkhipova Yu.A., Timchenko V.V. [4] determined the time of teething of 156 children of the first year of life born by HIV-positive women. It has been established that perinatal HIV infection contributes to delayed teething in children. Similar results were obtained in their studies of

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Aldrovandi G.M. [37] and Jsanaka S. [43].

Teething is an indirect indicator of the correct development of the child. As a physiological act, teething is not a painful phenomenon, does not cause pathological conditions. It is in direct connection with the general state of the child's health, timely tooth growth in a certain sequence indicates the normal development of his body [3,30].

Galonsky V.G. et al. [13,14] presented the results of a study of the process of teething of temporary and permanent teeth in children in the city of Krasnoyarsk. The sequence and average terms of teething, a temporary bite in the form of age ranges are determined. Characteristic differences in the terms of teething of temporary and permanent teeth in boys and girls, as well as regional features of these indicators among the examined contingent of children are noted.

Bimbas E.S. et al. [9] carried out the determination of the terms of teething of permanent teeth in an early removable bite in children of primary school age in Yekaterinburg. Some discrepancies with standard terms of teething are determined, which indicates the need for their refinement in each region. Gender differences in teething of permanent teeth are noteworthy. In all children, asymmetric teething of the upper incisors was observed. Similar results were obtained with Feraru I.V. etal. [39] studying Romanian children.

Ayupova F.S. [5] studied the sequence of teething fangs and premolars in 216 children aged 7-12 years. In children of the main group, caries of temporary teeth was combined with a violation of the location of permanent teeth and rudiments, deformation of dental arches, violation of the timing and sequence of eruption of permanent fangs and premolars. In his other studies, Ayupova F.S. [6] studied 998 medical records of children 3-10 years old who applied for orthodontic treatment from 2003 to 2012. It was found that the prevalence of secondary adentia in children of the Krasnodar Territory who applied for orthodontic care reached 31.27%. Upper incisors, first molars, lower fangs and their combination prevailed in the structure of prematurely removed temporary teeth. No gender differences in the structure of prematurely extracted teeth and their localization according to the quadrants of the dental arches were revealed.

Denisenko D.V., Yanovsky L.M. [17] analyzed the current aspect of studying the age of teething of permanent teeth in children of different regions. The authors propose uniform criteria for evaluating the process of teething of permanent teeth. Starchenko I.I. [33] on the basis of morphological studies gave a comparative description of the rudiments of the first and second human milk molars at 10-12 weeks of fetal development. During the study period, the early stage of the period of formation and differentiation of dental primordia was observed in the embryos of the first milk molars. The rudiments of the second molars lagged significantly behind the rudiments of the first molars and were at the stage of laying the tooth rudiments. It is suggested that there is a direct correlation between the degree of maturity of the rudiments of primary teeth in the early stages of odontogenesis and the timing of eruption of the corresponding primary teeth.

Iordanishvili A.K. et al. [22] provide data from a dental examination and study of cone-beam computed tomograms of the jaws of 93 men aged 18-27 years in order to study the anatomical and topometric characteristics of the upper and lower jaws during teething or retention of wisdom teeth. As a result of the study, the features of the anatomical structure of the alveolar process of the jaw in the region of the hillock of the retromolar space on the lower one during the eruption and retention of the molars were clarified.

Correctly and timely formed bite plays a large role in the normal development of the child's body. Teething problems can lead to malocclusion in children [30,38].

Terekhova T.N. [34] presented the norms of functions during the formation of the bite, described possible violations, the influence of bad habits on the formation of the maxillofacial region. She indicated methods of eliminating bad habits and normalizing the functions of the dentofacial system, which contribute to the proper development of this system in children and preventing the development of persistent dentofacial anomalies and deformations.

Vodolatsky M.P., Vodolatsky V.M. [12] studied the nature of malocclusion in children and adolescents according to the results of a dental examination of 2676 preschoolers and schoolchildren in Stavropol, 4-17 years old. The dynamics of deviations of the dental arches and apical basis of the upper and lower jaws in children aged 3-6 years was studied and the morphological characteristic of the dentition, in which 2 phases are distinguished - stable and labile, preceding the change of teeth.

For various reasons, a number of deviations may occur in the structure of the teeth, their location and development [5,14,19]: lack of a tooth germ, incorrect position of the tooth axis (horizontal and oblique), which makes it erupt outside the arch of the dentition or remains in the thickness of the jaw bone , incorrect formation of the tooth itself - size, shape, position, color, lack of enamel coating.

The reasons for the delay in teething are considered [2,20,22]: adentia (in the fetus, the process of formation of dental primordia is disturbed by various factors under the influence of various factors) and retention (not teething). The cause of adentia can be the melting of individual rudiments of permanent teeth as a result of the inflammatory process around the roots of deciduous teeth or a destructive process. Multiple congenital absence of teeth leads to disruption of the position of the teeth and functional overload of some of them, underdevelopment of the alveolar process, lower bite height, aesthetic deviations.

The severity of these disorders depends on the number of missing teeth on each jaw, the belonging of the teeth to the anterior or lateral group, the presence of delayed milk, concomitant disorders [28,40].

Functional and aesthetic disorders increase with an increase in the number of missing teeth and pairs of antagonists [1,30]:

- functional abnormalities include violations of biting off food, chewing, biting the side of the tongue and cheeks, lowering the height of the bite and shifting the lower jaw forward, to the side, parafunction of the muscles of the near-mouth area, infantility of swallowing, bad habits, improper pronunciation of hissing and deaf sounds, incorrect tongue articulation at rest and during function, omission of the back and root of the tongue;
- esthetic deviations include changes in the face and profile of the face, which are manifested by a decrease in the height of its lower part, thickening of the lips and inversion of their red border, deepening of the supramental furrow with neutral or distal bites, retraction of the upper lip and smoothness of the nasolabial folds with a mesial bite.

Often, adentia of more than 10 teeth is combined with impaired development of ectoderm derivatives (ectodermal dysplasia), manifested by a decrease in scalp, underdevelopment of eyebrows, eyelashes, nails, dry skin, its folding and pigmentation. dysfunction of the central nervous system (CNS). The listed changes are most pronounced in anhydrotic ectodermal dysplasia [34].

The most informative method of x-ray examination of the jaws, which allows to identify the edentia of individual teeth at various age periods of occlusion, is an orthopantographic study [15]. In addition, the method of computed tomography showed itself on a positive side [31,45].

It has been proven that with multiple adentia it is necessary to provide dental prosthetics as early as possible. Since children are stunted due to the fact that the body does not digest food, which are caused by difficulties in its intake, grinding, moisturizing with saliva. Children who do not have enough teeth are not sociable, easily injured and excitable, and suffer deeply from their pathology [6,7].

It has been established that the cause of retention may be the filling of the channel of a prematurely torn milk tooth with an adjacent tooth, improper placement of a permanent tooth in the jaw. The presence of retined teeth can lead to complications, since this pathology causes neuralgic pains in the face [8,41].

One of the reasons for delayed teething may be the presence of a follicular cyst. In this case, treatment in the form of surgical intervention will be preceded by radiography [30].

Due to improper follicular placement, supernumerary teeth are often retinated. In 67%, they erupt in the dentition or with deviations from it, and in 33% they remain retarded. Most of the retined teeth are located horizontally or with a turn in the direction of the nasal cavity [1,42].

In 90% of cases, supernumerary teeth cause various complications in the dentition, causing abnormalities, inflammatory and dystrophic changes in the surrounding tissues. The most frequently observed chronic inflammation of the mucous membrane in the area of a supernumerary tooth, periodontitis and resorption of the roots of adjacent teeth, follicular cysts, sometimes supernumerary teeth cause rhinitis, sinusitis, osteomyelitis. Quite often, supernumerary teeth cause speech and chewing difficulties, injure the lips, tongue, and oral mucosa [32,39]. The most characteristic anomalies in patients with supernumerary teeth are position, retention, false diastema, and crowding of permanent teeth.

Complications caused by retained teeth are symptomatic neuralgia of the II, III branches of the trigeminal nerve, caries and pulpitis of the retained tooth, which causes acute pain, caries and pulpitis of the retained tooth, acute and chronic periodontitis of the adjacent tooth, acute odontogenic osteomyelitis, abscesses and phlegmon follicles, near-root cysts, adamantinoma [29].

Anomalies of the bite arise due to uneven growth of the jaws, due to prolonged sucking of the nipples. Anomalies in the location of the teeth arise for constitutional reasons (small jaw sizes), due to injuries, with congenital disturbances in the exchange of connective tissue, with tumors of the alveolar bone of the jaw. Lack of teeth up to 1 year is extremely rarely associated with adentia. Check the presence of dental primordia using a special method of radiovisiography [1,2,30,44,46].

Ilyenko L.I. [23] Dentokind and Viburkol candles were prescribed for children with painful teething to improve the quality of life. A total of 200 children were examined. As a result of the study, it was found that both drugs are effective and safe and can be recommended for the treatment of painful symptoms of teething.

Goreva E.A. et al. [16] studied the clinical manifestations of teething in a child, evaluated the efficacy and safety of the use of Pansoral First Teeth to alleviate teething syndrome in children.

Musabekova Zh.A. et al. [29] found that perinatal lesions of the central nervous system are one of the most pressing problems in children's practice, as they often lead to maladaptation of the child in the social environment, and in severe cases to disability. Actovegin intramuscularly in an age-related dosage was received by children with neurological pathology. During treatment with Actovegin in infants with neurological pathology, its effect on teething was revealed. In foreign and domestic literature, works devoted to the study of the influence of environmentally disadvantageous factors on the timing and order of eruption, the formation of tooth roots in children are rare.

Research Inoyatova A.Sh. et al. [24,25] is devoted to the study of the influence of environmental factors on the formation of tooth roots in children. The authors indicate that if unfavorable environmental factors affect the process of embryogenesis of the maxillofacial region, this will also affect the timing and order of teething, as well as the formation of occlusion in children.

2. Conclusions

Thus, the process of teething and the formation of the bite are a physiological process, which is one of the important indicators of the health status and physical development of

the child. However, there are a number of factors that have an unfavorable effect on this process and create an opportunity for the development of a pathological process. In this regard, despite the numerous works of domestic and foreign researchers on this topic, the development of methods for early diagnosis, prognosis of the course and outcome of the pathology of teething and the formation of occlusion in children remains relevant and in demand.

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