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STUDYING OF CHARACTERISTICS OF THE EMERGENCE OF CARIES IN THE FIRST PERMANENT MOLARS IN CHILDREN IN THE FIRST YEARS AFTER THEIR ERUPTION

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Introduction
Affected by caries of permanent teeth in children is observed shortly after their eruption [1]. The highest percentage of lesions among permanent teeth in childhood occurs on the first permanent molars, which are the first to appear in the oral cavity [2]. The reason for this is a number of factors, among which the weak mineralization of the fissures and pits of the chewing surface of the molars and the pathogenic microflora of plaque, which is usually not completely removed by young patients while brushing their teeth, are decisive [3].

An important role in the development of molar caries is played by the peculiarity of their odontoglyphics [4]. Data from morphological studies indicate that crowns with three pits in the Y5 and Y6 patterns, and with two pits in the +5 and Y4 patterns are found in the lower molars, and the Y5 pattern of the chewing surface is the most prone to caries. In the upper first molars, crowns of type I with two close points of fusion of intertuberosous fissures and a short distance between two pits and type II with distant points of fusion of intertuberosous fissures and a greater distance between pits are identified, which is a risk factor for the occurrence of caries in molars of this type [5].

Objective of our research was to study the characteristics of caries development in the first permanent molars in childhood, taking into account their odontoglyphics in the first years after eruption.

Subjects and methods
To achieve the goal, a study of 540 first permanent molars of 155 children without background pathology aged 6 years, students of secondary schools in Poltava, was carried out.

The examination was carried out in a dental chair using a mirror and a probe. The type of pattern of the chewing surface of the teeth was determined according to the schemes of odontoglyphic variants of molars of the upper and lower jaws, proposed by A.P. Hasyuk and Skrypnikov P.M. (2001).

The odontoglyph pattern of the molars was determined in intact teeth that did not have signs of initial forms of caries, after staining the chewing surface with a 2% solution of methylene blue for a better visual inspection.

To study the frequency of caries lesions of the first permanent molars, depending on their odontoglyphics, 268 teeth were selected from among the examined teeth, which had the most common types of chewing surfaces. The dynamics of the occurrence of fissures caries and the localization of carious foci were studied in these teeth during the 3-year study.

The obtained data were processed by the method of variation statistics. The assessment of the probability of the difference in indicators was carried out using the method of differences. Differences were considered probable at p≤0,05.

Results and discussion
A clinical study of 540 first permanent molars with an intact chewing surface showed that the most common type of the chewing surface of the lower molars was the Y5 pattern (57%), the other types were distributed in the following sequence according to the frequency of occurrence: type +5 (36,26%), type +4 (4,58%), type Y4 (1,28%), type Y6 (0,92%). Types Y5 and Y6 had three pits of fusion of intertuberosous fissures: central-anterior (α), central-posterior (β) and central-central (γ), and types +5 and Y4 had two pits – central-anterior (α) and central-posterior (β), type +4 had one pit.

The upper molars mostly had a 4-cusped crown and had two types of chewing surfaces: I - with close placement of the pits relative to the central furrow (2,87%) and II - with remote placement of the pits relative to the central furrow (97,13%). 4-cusped molars had two pits of fusion of intercusped fissures: central-anterior (α) and central-posterior (β).

Subsequently, the dynamics of the occurrence of caries was determined in 268 first permanent molars of the children we examined, who had the most common types of chewing surface (Y5, +5, II type).

After six months of the study, the prevalence of caries of the chewing surfaces of the upper molars was 1,01 ± 0,50%, of the chewing surfaces of the lower molars – 2,59 ± 0,85%, after a year – 5,05 ± 1,1% and 8,36 ± 1,49% respectively. During the 1st year of observation, the increase in caries of the chewing surfaces of the lower molars was 8,36% of the surfaces, the chewing surfaces of the upper molars – 5,05% of the surfaces. Therefore, during the first year after eruption, caries occurred only on the chewing surfaces of the molars.
A year later, caries in the blind pits of the vestibular surfaces was diagnosed in the lower molars. The prevalence of caries on these surfaces was 0.58 ± 0.41%, and the increase in caries during the 1st year of observation was 0.58% of surfaces.

After two years of observation, the prevalence of caries of the chewing surfaces of the upper and lower molars, as well as the vestibular surfaces of the lower molars, increased significantly (p<0.05) and amounted to 9.09 ± 1.44%, 17.00 ± 2.02%, and 2.88 ± 0.90%. During the 2nd year of observation, the growth of caries on the chewing surfaces of the lower and upper molars amounted to 8.64% and 4.04% of the surfaces, respectively, on the vestibular surfaces of the lower molars – 2.30% of the surfaces.

After three years of observation, the prevalence of caries of the chewing surfaces of the upper and lower molars, as well as the vestibular surfaces of the lower molars, increased significantly (p<0.05) and amounted to 14.93 ± 2.18%, 23.58 ± 2.71%, and 8.54 ± 1.78%. During the 3rd year of observation, the growth of caries on the chewing surfaces of the lower and upper molars amounted to 4.07% and 3.36% of the surfaces, respectively, on the vestibular surfaces of the lower molars – 4.47% of the surfaces.

Studying the dependence of the occurrence of fissure caries in molars with different odontoglyphics during the entire observation period did not reveal a significant difference between the lesions of the lower molars with Y5- and +5-patterns of the chewing surface (27.01% and 22.83%, respectively).

Investigating the dynamics of the occurrence of carious foci and their localization on the chewing surfaces of molars, it was found that after 6 months of research, caries was localized exclusively in the pits. No damage to the furrows was detected.

After 12 months of observation, caries was diagnosed not only in the pits, but also in the grooves of the chewing surface (96.23% and 3.77%, respectively), although the share of the latter from the total number of lesions was insignificant (p<0.001). In the lower molars, no furrows were affected, and in the 2 upper molars, the furrow that separates the tubercle of Karabelli was affected.

After 2 years of observation, caries in the molars of the upper and lower jaws was detected in the pits and furrows of the chewing surface, but the share of the latter, as before, remained insignificant (p<0.001). During the second year of observation, 10 cases of pit damage and 1 case of furrow damage were diagnosed in the upper molars, which accounted for 91% and 9%, respectively. 27 carious pits and 7 carious furrows were diagnosed in the lower molars, which accounted for 79.4% and 20.6%, respectively. According to the frequency of lesions, the furrows were located in the following sequence: vestibular – 42.86%, distal – 28.58%, distolingual and lingual – 14.28% each.

During the second year of the study, there was a significant increase in caries in the grooves of the lower molars and a decrease, almost twofold, in the increase in caries in the grooves of the upper molars compared to previous data. During this period, 84.91% of caries cases were diagnosed in pits and 15.09% - in furrows of the chewing surface of molars.

After 3 years of research, the percentage of carious furrows from the total number of lesions probably increased (74.58%) (p<0.01) compared to previous data, but remained almost 3 times lower than the percentage of carious pits (25.42%) (p<0.001).

During the 3rd year of observation, 9 cases of pit damage and 6 cases of furrow damage were diagnosed in the upper molars, which accounted for 60% and 40%, respectively. According to the frequency of lesions, the furrows were located in the following sequence: distal - 50%, distolingual – 33.33%, lingual – 16.67%. In the lower molars, 2 cases of damage to the pits and 16 cases of damage to the grooves were found, which amounted to 11.11% and 88.89%, respectively. According to the frequency of lesions, the furrows were located in the following sequence: vestibular – 31.25%, mesial - 25%, distal – 18.75%, distolingual and lingual – 12.5% each. So, during the 3rd year of observation, 66.67% of caries cases were diagnosed in furrows and only 33.33% of cases – in pits of the chewing surface of molars.

As a result of the study, it was found that shortly after the eruption of the first permanent molars, caries appeared in the pits of their chewing surfaces. With the passage of time (after 12-36 months), along with the pits, the furrows of the chewing surface were also affected by caries. In the first two years after the eruption of the molars, the frequency of damage to the pits was much higher than to the furrows. During the 3rd year after eruption, the frequency of damage to pits decreased and the frequency of damage to furrows increased significantly. But during the entire observation period, the number of carious pits was probably higher than the number of affected furrows (p<0.001).

Analysis of the frequency of damage to each pit of the upper molars showed that after 3 years of study, the number of carious anterior (α) and posterior (β) pits was the same (17.09% and 17.09%). In the lower molars with the Y5 pattern, the central-anterior fossa (α) was the least susceptible to caries compared to the other two. There was no significant difference between the frequency of lesions of the central-posterior (β) and central-central (γ) pits during the entire observation period (p>0.05).

In the lower molars with a +5 pattern of the chewing surface, during the entire observation period, the central-anterior fossa (α) was more often affected by caries compared to the central-posterior fossa (β), which after 36 months amounted to 14.13% versus 3.26%, respectively.

Thus, the central-central fossa (γ) was the most susceptible to caries in molars with a Y5 pattern of

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the chewing surface, and the central-anterior fossa \((\alpha)\) in molars with a +5 pattern. In upper molars with type II chewing surface, both pits were susceptible to carious lesions.

So, at the age of 6, only the chewing surfaces of permanent molars were affected by caries, and the increase in caries of these surfaces was the highest in the first two years of observation, during the third year this process slowed down. Lower jaw molars with complicated odontoglyphics were affected equally often, and pits were the most caries-susceptible recesses of the chewing surface of molars. The vestibular surfaces of the permanent molars of the lower jaw were affected at the age of 7 years (one year after eruption), and the growth of caries on these surfaces increased during the second and third years, reaching maximum values after 36 months of observation.

Conclusions

The obtained data encourage childrens' dentists not only to carry out preventive measures in the first permanent molars of children in the early period after their eruption, but also to carry out sanitary and educational work among parents about the need for regular preventive examinations of children with the aim of early diagnosis of caries in the first permanent molars.

Authors’ contribution statement

The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.

Conflict of interests

The author declares that there is no conflict of interest.

Summary

The highest percentage of lesions among permanent teeth in childhood occurs on the first permanent molars.

Objective of our research was to study the peculiarities of caries development in the first permanent molars in childhood, taking into account their odontoglyphics in the first years after eruption.

Materials and methods. The type of pattern of the chewing surface of the teeth was determined according to the schemes of odontoglyphic variants of molars of the upper and lower jaws, proposed by A.P. Hasyuk and Skrypnikov P.M. (2001) of 540 first permanent molars in 155 children aged 6 without pathology.

To study the frequency of caries lesions of the first permanent molars, depending on their odontoglyphics, 268 teeth were selected from the examined teeth, which had the most common types of chewing surfaces. The dynamics of the occurrence of fissures caries and the localization of carious foci were studied in these teeth during the 3-year study.

Results and discussion. During the 1st year of observation, the increase in caries of the chewing surfaces of the lower molars was 8.36% of the surfaces, of the upper molars – 5.05% of the surfaces. A year later, caries in the blind pits of the vestibular surfaces were diagnosed in the lower molars, and the caries prevalence of these surfaces was 0.58 ± 0.41%. After three years of observation, the prevalence of caries of the chewing surfaces of the upper and lower molars, as well as the vestibular surfaces of the lower molars, increased significantly and amounted to 14.93 ± 2.18%, 23.58 ± 2.71%, and 8.54 ± 1.78%.

It was found that shortly after the eruption of the first permanent molars, caries appeared in the pits of their chewing surfaces. With time (after 12-36 months), along with the pits, the furrows of the chewing
surface were also affected by caries. But during the full observation period, the number of carious pits was probably higher than the number of affected furrows.

**Conclusions.** The obtained data encourage childrens’ dentists not only to carry out preventive measures in the first permanent molars of children in the early period after their eruption, but also to carry out sanitary and educational work among parents about the need for regular preventive examinations of children with the aim of early diagnosis of caries in the first permanent molars.

**Key words:** children, first permanent molars, odontoglyphics, fissures, pits.