

THE MINISTRY OF HEALTH OF UKRAINE  
THE HIGHER STATE EDUCATIONAL INSTITUTION OF UKRAINE  
"UKRAINIAN MEDICAL STOMATOLOGICAL ACADEMY"

Approved  
at the meeting of orthodontics department  
«\_\_\_\_»\_\_\_\_\_20\_\_\_\_y.  
protocol №\_\_\_\_by \_\_\_\_\_  
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**METHODICAL RECOMMENDATION**  
**for independent work of students during the preparation**  
**to practical lessons and on the lessons**

Academic discipline	Orthodontics
Module №1	Orthodontia. Diagnostic of dento-gnathic anomalies and deformations.
The theme of the lesson № 2	Morphological and functional features of temporary occlusion. It's main periods. Symptom by Tsilinskij, its prognostic significance. Closing planes by Schwarz. Mechanism of denta-jaw region growth and development in this period of development.
Course	III
Faculty	Preparation of foreign students

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**1. The relevance of the topic.** Background due to the need to know the morphological and functional features of the temporary occlusion structure.

**2. Specific objectives:**

To know the features of the temporary occlusion structure;

To know the features of the structure of the upper and lower jaws in temporary occlusion;

To know the features of the structure of bite in temporary occlusion;

To know the structural features of TMJ in temporary occlusion;

To know the three periods of temporary occlusion;

To know the times of formation and occlusion by Zubkova, Horoshylkina;

To know the symptoms by Tsylinsky;

To know the final plane by Schwarz.

**3. Basic knowledge, abilities, skills necessary for studying the topic (interdisciplinary integration)**

Name of previous disciplines	Skills
1. Anatomy	The periods of the human development. Features of the structure of the facial bones. The structure of the TMJ in different age periods. Anatomical features of different groups of temporary teeth. To able to identify the group of the temporary teeth.
2. Prevention of dental diseases	Timing, order and sequence of eruption of temporary teeth. Number of teeth in the temporary occlusion.
3. Propaedeutic of therapeutic stomatology	The structural characteristics of temporary teeth.

**4. Tasks for independent work during preparation to the lesson and on the lesson**

4.1. A list of the main terms, parameters, characteristics that need to learn by the student during the preparation to the lesson:

Terms	Definition
1. Temporary (deciduous, primary) occlusion	The period of dentition, when in the oral cavity there are only temporary teeth.
2. Rules of teeth eruption	Twoness, the timing, sequence and order.
3. Symptoms by Tsylinsky	Estimate the relation of the distal surfaces of second temporary molars.

#### 4.2. Theoretical questions to the lesson:

1. The characteristic of temporary occlusion periods.
2. Patterns of temporary teeth eruption.
3. The first physiological increase of a bite.
4. Features of temporary occlusion' stable period.
5. Classification of temporary teeth abrasion.
6. Prediction of the of bite development, depending on the relation of the second temporary molars.
7. Tsylynsky' symptom and its importance in the formation of permanent occlusion.
8. Terminal planes by Schwarz.

#### 4.3. Practical works (task) which are executed at the lesson:

1. To determine the child's age because of an anamnesis. To determine the period of the malocclusion formation by Zubkova and Khoroshylkia
2. Pay attention to the difference between temporary and permanent teeth (color, size, crowns, casps' abrasion.
3. To determine the period of the child development according to the age of patient and intra-oral signs of different periods of temporary bite.
4. To determine the relation of the second temporary molars.
5. To pay attention to the age of patient, and on relation of the canines.
6. To make a temporal bite' formula (clinical, by WHO, anatomical).
7. To pay attention to the age of patient and the affiliation of teeth to the temporary bite.

#### **The content of the topic:**

After 6-8 months, during which the jaws of babies reform and become able to teething (eruption) of teeth. Temporal teeth, the rudiments of which are contained in the alveolar sprouts of jaws, pass certain stages of development, they teeth gradually, forming the bite of temporal teeth.

Formation of a temporal bite is divided into three periods:

- 1 period of formation (from 6 months to 2-2,5 years);
- 2 is period of stable temporal bite (from 2,5 to 4 years);
- 3 is period of aging

Due to the growth and development of a child there are the changes in the dento-jaw system, new functions appear or the existing system is reformed.

Before teething (eruption) of temporal teeth rudiments move in growing jaws. Thus, there appears resorbtion of bone fabric before a tooth rudiment.

New bone fabric accumulates from an oral side. The bone wall of alveolus is considerably multiplied from the distal side of every lateral tooth.

From the cheek and occlusal sides of rudiments the increase of new bone fabric does not occur. This fact testifies that teeth move towards to an occlusal surface and the level of occlusion rises slowly. Teething (eruption) of temporal teeth, which continues approximately for two years, begins at the age of six month, and continues up to the age of two and a half.

For the accelerated type of child development this period continues for 2 years, for the slow type – 3 years.

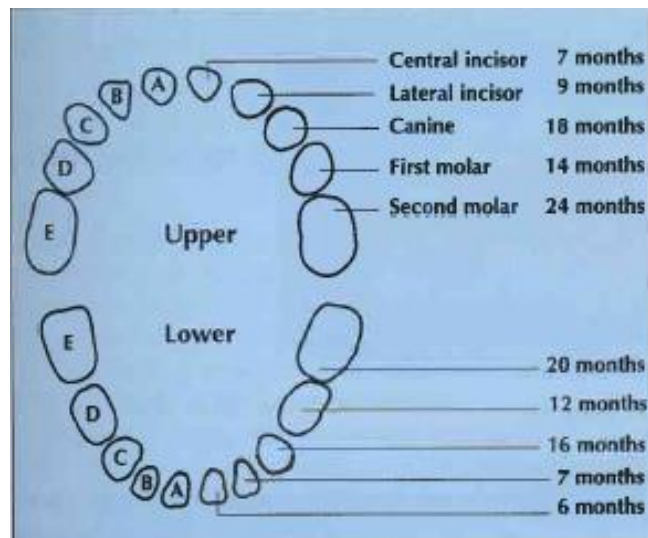
Teething (Eruption) of temporal teeth are characterized by the following patterns.

- terms;
- order of teething (eruption);
- twoness of teething (eruption);
- sequence of eruption.

Order and sequence of teething (eruption) of temporal teeth:

Upper jaw - I, II, IU, III, U

Lower jaw - I, II, IU, III, U



The timing of eruption is highly variable, so these values are only approximate: 1. At 6 months: primary mandibular incisor 2. Between 6 and 13 months: the other primary incisors 3. Between 12 and 18 months: primary first molars 4. Between 18 and 24 months: primary canines 5. Between 24 and 36 months: primary second molars. After the emergence of the 20 primary teeth, the primary dentition remains relatively stable for about 4 years. First teeth erupt on the lower jaw, except for lateral chisels and first temporal molar, which erupt on the maxilla.

Without regard to the fact that first temporal molars erupt first, canines in a temporal bite occupy correct position in the dental arc, because they have a possibility to move the first molar back, as second temporal molar hasn't erupted yet.

The first physiological height bite increasing begins with due to the fact that teething (eruption) of first temporal molars. They have the same role in a temporal bite, as permanent teeth in variable bite – they support a bite on a certain height.

Twoness of teething (eruption) is expressed by the following. The teeth of the same name erupt simultaneously.

The violation of twoness of teething of the teeth of the same name on the different sides of jaws is the sign of growing lag and in some cases there can be observed the anomalies of development of dental arcs and jaws.

With teething (eruption) of teeth and development of function of mastication the alveolar sprouts of jaws grow actively; basal part of lower jaw thickens; the branches of lower jaw grow; relief and structure of jaws become more complex.

The dynamics of teething (eruption) plays a very important role for the development of the facial skeleton, as an alveolar process is formed parallel to growth and teething of teeth. During teething (eruption) of temporal teeth intensive development of alveolar sprouts of jaws place in horizontal and vertical directions. The dental arcs of temporal bite appear after the completion of temporal teeth eruption.

At the age of 2 and a half the period of temporal bite finishes – the formation period. Due to the first physiological bite increasing the volume of oral cavity increases.

II period of temporal bite is named a “stable temporal bite”. It continues to the age of 4.

III period of temporal bite, which is named the period of “ageing” is characterized by the teeth abrasion.

4-year-old child has 20 temporal teeth and 28 rudiments of permanent teeth, which are located in the area of eye sockets, nasal cavity on the maxilla and lower jaw and are covered by thin layer of bone of 2-4 mm. Up to the age of 4 after teething (eruption) and the end of formation of temporal teeth roots the growth of alveolar sprouts stops and begins again at the age of 5,5-6 years.

Absence of spaces is unfavorable condition for correct establishment of permanent frontal teeth in the dental row.

During the III period of temporal bite the lower jaw due to uneven growth and tendency to the mesial moving, to physiology elimination of knolls of teeth the mesio-buccal cusp of upper second temporal molar's moves from the first in the second furrow (between middle and distal cheek cusps) and distal surfaces of second molars form a sagittal step. It is named the Tsilinsky' symptom. By the correlation of distal surfaces of second temporal molars at the age of 6 development of bite in sagittal direction can be forecast. During a clinical check up it is very important to define the correlation of distal surfaces of second temporal molars and difference of size of their crowns. In such cases it is recommended to estimate correlation of stomach-teeth, which remains unchanged during all temporal bite and does not change after teething (eruptions) of first permanent molars. Even insignificant wrong correlation of temporal canines is unfavorable for development of normal bite.

The deciduous dentition stage starts from the eruption of the first deciduous tooth, usually the deciduous mandibular central incisors and ends with the eruption of the first permanent molar, i.e. from 6 months to 6 years of postnatal life. By 2 years of age, deciduous dentition is usually complete and in full function. Root formation of all deciduous teeth is complete by 3 years of age. Because primary dentition is transitory and operates on evolving basal bone, the occlusion of the primary teeth can be classified into three categories (Tollaro 1990): the normal primary dentition; the at-risk primary dentition; and the pathologic primary dentition.

### **Normal Signs of Primary Dentition**

a. Spaced anteriors (anterior diastemata): spacing is usually seen in the deciduous dentition to accommodate larger permanent teeth in the jaws. Spacings In the primary dentition stage a child may have generalized spaces between the teeth, localized spaces, no spaces, or a crowded dentition. The presence of spacing in the primary dentition stage is a common occurrence. According to Foster,<sup>2</sup> generalized spacings occur in almost 2/3 of the individuals in the primary dentition stage. In addition to the generalized spacings, localized spacings are often present and are referred to as primate spaces. Such spaces are present in 87% of the maxillary arches usually between the lateral incisors and canines. The primate spaces are also present in 78% of the mandibular arches, usually between the canines and first primary molars. A tooth size-arch length discrepancy (TSALD) in the form of crowding is less common and occurs in approximately 3% of the children in the primary dentition stage.

b. Primate/ simian/ anthropoid space: this space is present mesial to the maxillary canine and distal to the mandibular canine. Most subhuman primates have it throughout life and use it for interdigitation of opposing canines. This space is used for early mesial shift.

c. Shallow overjet and overbite.

**Overbite** is the amount of vertical overlap between the maxillary and mandibular central incisors. This relationship can be described either in millimeters or more often as a percentage of how much the upper central incisors overlap the crowns of the lower incisors. The overbite in the primary dentition normally varies between 10% and 40%. When the incisal edges of the incisors are at the same level, the condition is described as "edge to edge or zero overbite." When there is a lack of overlap, the condition is described as open bite and quantified in millimeters. Foster<sup>2</sup> in a study of 100 British children between 2 and 3 years of age described the overbite relationship as ideal (19%), reduced (37%), open bite (24%), and excessive overbite (20%). The fact that more than 60% of the children in this population have a reduced overbite or an open bite is attributed to the effects of the various oral habits (finger or pacifier sucking) that are common in this age group.

**Overjet** is the horizontal relationship or the distance between the most protruded maxillary central incisor and the opposing mandibular central incisor. This relationship is expressed in millimeters. If the maxillary incisors are lingual to

the mandibular incisors, the relationship is described as an underjet. The normal range of overjet in the primary dentition varies between 0 and 4.0 mm. In the same study by Foster,<sup>2</sup> the overjet was ideal in 28% of the cases and excessive in 72% of the children. Again, the presence of excessive overjet was attributed to the effects of the oral habits.

d. Virtually perpendicular relationship between most teeth and basal bone, with interincisal angles of 150 degrees.

e. Ovoid arch form and transverse harmony of the dental arches. Alignment of the maxillary and mandibular frenum.

f. Flat occlusal plane

g. Articulation of the maxillary canine with the mandibular canine and the primary mandibular first molar. Molar Relationship - Class I molar relationship: flush terminal plane or terminal plane with a mesial step.

Straight/flush terminal plane relation: the molar relationship in the primary dentition can be classified into 3 types.

- Flush terminal plane when the distal surfaces of maxillary and mandibular deciduous second molars are in the same vertical plane; this is the normal molar relationship in the primary dentition because the mesiodistal width of the mandibular molar is greater than the mesiodistal width of the maxillary molar

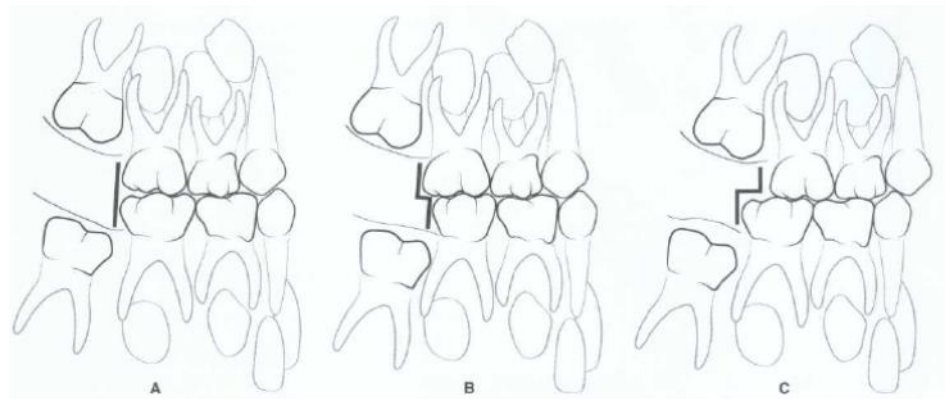
- Mesial step - distal surface of mandibular deciduous second molar is mesial to the distal surface of maxillary deciduous second molar.

- Distal step - distal surface of mandibular deciduous second molar is more distal than the distal surface of maxillary deciduous second molar, i.e. the upper second molar occludes with two opposite teeth. Between 5 and 6 years, just before shedding of the deciduous incisors, there are more teeth in the jaws than at any other time.

The word relative needs to be emphasized; the description of a mesial or distal step does not identify which of the two arches is ahead or behind the other. In a study on 121 Iowa children at age 5 years, the distribution of the terminal plane relationships of the primary second molars were found to be as follows: Distal step 10% Flush terminal plane 29% Mesial step of 1.0 mm 42% Mesial step >1.0 mm 19% Therefore almost 90% of the cases had a terminal plane relationship, which was either flush or with a 1.0-mm or greater mesial step. Determining the terminal plane relationships in the primary dentition stage is of great importance to the clinician because the erupting first permanent molars are guided by the distal surfaces of the second primary molars as they erupt into occlusion.

The permanent first molars emerge along the distal surfaces of the maxillary and mandibular primary second molars, which have been described as the terminal plane. The terminal planes predetermine the position the permanent first molars will occupy in the dental. However, other factors, such as maxillary and mandibular growth rates, the leeway space, the size and the shape of the teeth, and environmental factors such as caries and premature loss of primary teeth, can play

a role. In addition, so-called noxious habits and the functional matrix can exert considerable influence.



Although the primary dentition may be normal, this is no guarantee that the permanent dentition will be free of malocclusion. In general, indications of malocclusion can make their first appearance as the permanent teeth erupt, but their primary etiologic factors and especially the influence of the functional matrix manifest themselves during periods of more rapid growth.

#### **Characteristics of at-risk and pathologic primary dentitions.**

When any of these conditions is present, a primary dentition can be considered to be at risk of developing a malocclusion:

1. Absence of diastema
2. Crowding
3. Terminal planes that have:
  - A mesial step and where there are large diastema distal to the mandibular canines and the incisors are in end-to-end occlusion, suggesting a developing Class III malocclusion
  - A distal step or are flush and where there are excessively large maxillary canines, suggesting a developing Class II malocclusion
  - A mesial step and where the maxillary and mandibular incisors are inclined lingually and/or the incisors are in supraocclusion, suggesting a developing Class II division 2 malocclusion or a Class III malocclusion
4. Insufficient space for eruption of permanent teeth following extraction of, or untreated interproximal dental caries in, the corresponding primary teeth
5. Functional disturbances arising from:
  - Unilateral mastication that stems from a child's avoidance of painful occlusal contact on one side or from a premature contact, usually of canine teeth, or other occlusal interferences
  - So-called noxious habits, such as excessive sucking of a finger or a pacifier, mouth breathing, or atypical swallowing
6. Sequelae of trauma:
  - Loss of space from the accidental loss of a tooth
  - Traumatic impact on a permanent tooth germ
  - Pulpal necrosis accompanied by an untoward modification in the physiologic root resorption of the primary tooth



- Temporomandibular joint problems, such as luxation of the discs, that could provoke midline deviations as condyles readjust and establish a difference between the Angle classifications of the right and the left sides

All the types of malocclusion that can occur in the mixed and permanent dentitions may appear in the primary dentition.

### **Functions of the primary dentition.**

One of the chief functions of the primary dentition is to provide a mechanism for chewing. Occlusion in the primary dentition is rudimentary, and the dental morphology is rather flattened. The morphology is not as complex as that of the permanent dentition, which will function at a time when more sophisticated mastication will be required. The primary dentition also participates in the development of facial height. As the mandible and maxilla grow downward and forward, corresponding points in the two jaws move away from each other, following divergent lines. To compensate for these emerging gaps, maxillary structures, especially the alveolar process, grow vertically, and the child passes from the edentulous state of the newborn into the successive stages of the primary, mixed, and permanent dentitions. In addition, the primary dentition sets the stage for the emergence of the permanent teeth by guiding them as they erupt and by establishing and preserving the space needed for the permanent dentition.

Skeletal and neuromuscular characteristics of the primary dentition. In newborn babies, the glenoid fossae of the temporomandibular joint are flat; in the absence of teeth and the masticatory movements that would accompany them, the mandible moves only horizontally, back and forth, sucking on the mother's breast or on the bottle. When the primary teeth begin to erupt, the articular discs organize for more sophisticated action, the glenoid fossae deepen, and the condylar slope augments progressively. As teeth continue to erupt, the muscles of mastication learn to accomplish all the movements required for functional activity.

During the primary dentition stage the overbite, overjet, and anteroposterior relationship of the dentition do not undergo significant changes unless they are influenced by environmental factors such as trauma, habits, or caries. At the late primary dentition stage of development, the maxilla and mandible are housing the greatest number of teeth ever, including 20 erupted primary teeth and at least 28 unerupted but partially forming permanent teeth.

### **Materials for self-control:**

A. Tasks for self-control (tables, diagrams, drawings, graphs):

1. Write down the periods of temporary occlusion.
2. To draw in albums the sequence scheme of teeth eruption.
3. Write down the characteristics of temporary occlusion's stable period.
4. Write down the classification of temporary teeth abrasion.
5. To draw in albums the scheme of relation of first molars.
6. To draw in albums the terminal planes by Schwarz.

B. Tests for self-control:

1. I period of temporary occlusion continues:
  - from 6 months to 2.5 years
  - from birth to 6 months
  - from 1 to 3 years
  - from 1.5 to 3.5 years
  - from 2 to 4 years
2. II period of temporary occlusion entitled:
  - formation period
  - aging period
  - stable period
  - abrasion period
  - early period
3. The main feature of the first period of temporary occlusion is:
  - the eruption of deciduous teeth
  - no diastem and thremas
  - abscence of occlusal curves
  - the presence of spaces between teeth
  - the signs of temporary molars abrasion
4. The 1<sup>st</sup> stage of the physiological height bite increasing corresponds eruption of:
  - temporary molars
  - temporary central incisors
  - temporary canines
  - temporary central incisors
  - temporary lateral incisors
5. The physiological height bite increasing helps:
  - to increase the volume of the oral cavity
  - growth maxilla
  - growth of the mandible
  - growth maxillary sinus
  - growth of the nose
6. II period of temporary occlusion entitled:
  - stable period
  - formation period
  - aging period
  - abrasion period
  - late period
7. The upper dental arch in temporary occlusion has the form:

semicircle  
parabola  
trapezoid  
v-shaped  
semi ellipse

8. The lower dental arch in temporary occlusion has the form:  
semicircle  
parabola  
trapezoid  
v-shaped  
semi ellipse
9. Distal surface of the second temporary molars in the first period of temporary occlusion are as follows:  
located in the same vertical plane  
have sagittal step  
have a vertical step  
have transversal step  
without contact
10. The Tsylinsky' symptom to predict the development of occlusion in this plane:  
sagittal  
vertical  
orbital  
transversal  
Frankfurt
11. The features of the second temporary molars contact in the first period of temporary occlusion depends on:  
their size mesio-distal sizes  
heredity  
cusps abrasion  
the presence of spaces between teeth  
chewing efficiency
12. The II period temporary occlusion is characterized by:  
dense proximal teeth contacts, 1/3 incisors covering, no signs of teeth abrasion, distal surfaces V / V in a one vertical plane  
dense proximal teeth contacts  
incisors covering is 1/3  
no signs of teeth abrasion  
a placement of distal surfaces V / V in one a vertical plane

13. III period of temporary occlusion is entitled:  
aging or involution  
formation  
stable  
early  
late
14. The shape of the dental arches in temporary occlusion does not depend on:  
teeth mineralization  
the type of breathing  
the number of teeth  
the size and location of the tongue.  
heredity
15. When does the start of infantile type to somatic type of swallowing transformation:  
the eruption of temporary central incisors  
with the eruption of lateral incisors  
with the eruption of temporary molars  
with the eruption of temporary canines  
with the eruption all temporary teeth
16. The height of the bite in the period of temporary occlusion support:  
temporary molars  
temporary central incisors  
the temporary lateral incisors  
temporary teeth  
temporary canines
17. The Tsylinsky' symptom - is:  
the sagittal step between the second temporary molars distal surfaces  
the sagittal space between temporary incisors  
the contact between temporary canines  
the contact between the central incisors  
the contact between the lateral incisors
18. Which symptom does not meet the third period of temporary occlusion:  
physiological retrogeny  
direct incisor contact  
the Tsylinsky' symptom  
the presence of spaces between teeth  
temporary teeth abrasion

19. How to evaluate the presence of spaces between the teeth in the third period of temporary occlusion:  
the favorable symptom  
inherited symptom  
the pathological symptom  
the forming protrusion symptom  
the forming retrusion symptom
20. Relation between the next teeth remains constant at all stages of temporary occlusion:  
canines  
canines and incisors  
canines and molars  
incisors and molars.  
incisors, canines and molars
21. If mezio-dystal sizes of lower second temporary molar more than the same upper in 2 mm, their distal surfaces create:  
direct lines  
mesial step  
distal step  
the vertical step  
vertical space
22. If mezio-dystal sizes lower second temporary molar are equal to the same upper, their distal surfaces create:  
mesial step  
direct lines  
distal step  
the vertical step  
vertical space
23. If mezio-dystal sizes of lower second temporary molar more than the same upper in 3 mm, their distal surfaces create:  
distal step  
mesial step  
direct lines  
the vertical step  
vertical space
24. Temporary bite consisting of:  
20 temporary teeth  
24 temporary teeth  
28 temporary teeth

32 temporary teeth

22 temporary teeth

25. Which morphological features of temporary occlusion create conditions for the formation of physiological permanent occlusion?  
the spaces between teeth, canines neutral relation, Tsylin'sky' symptom, edge to edge incisors contact  
dental arches are semi oval  
upper frontal teeth cover the same lower in a third of the crown height  
the presence of distal step between the second molar  
the absence of spaces between teeth
26. If the distal surface of the second temporary molars in 6 years old child are in the same plane, it can be considered as:  
distal bite formed  
the risk factor  
the mesial bite formed  
deep bite formed  
cross-bite formed
27. The second temporary molar relation in norm depends on:  
mesio-distal sizes  
cusps abrasion  
frontal spaces  
hereditary  
the functions of masticatory muscles
28. The III degree of temporary teeth cusps abrasion by Vladislavov is:  
cusps abrasion all of teeth  
cusps abrasion canines and incisors edge surfaces  
cusps abrasion canines only  
cusps abrasion incisors edge surfaces  
cusps abrasion canines and molars
29. The II degree of temporary teeth cusps abrasion by Vladislavov is:  
cusps abrasion canines and incisors edge surfaces  
cusps abrasion all of teeth  
cusps abrasion canines only  
cusps abrasion incisors edge surfaces  
cusps abrasion canines and molars
30. The I degree of temporary teeth cusps abrasion by Vladislavov is:  
cusps abrasion incisors edge surfaces  
cusps abrasion canines and incisors edge surfaces

cusps abrasion all of teeth  
cusps abrasion canines only  
cusps abrasion canines and molars

31. The most active period of the mandible growth is:

lactation period  
6-8 years  
3-5 years  
mixed dentition period  
the period of permanent occlusion

32. The features of the newborn oral cavity structure include:

the gingival membrane (Roben- Mazhyto) presence, flat hard palate,  
physiological retrogeny, big tongue  
gingival rollers (Roben-Mazhyto), flat hard palate  
big folds in the frontal area of the hard palate.  
flat hard palate, big tongue, big lips  
physiological retrogeny

33. The II period of temporary occlusion continues:

from 2.5 to 4 years  
from birth to 6 months  
from 6 months to 2.5 years  
from 1 to 3 years  
from 1.5 to 3.5 years

34. The III period of temporary occlusion continues:

from 4 to 6 years  
from birth to 6 months  
from 6 months to 2.5 years  
from 1 to 3 years  
from 1.5 to 3.5 years

35. What is primates spaces?

spaces between canines and first temporary molars  
spaces between the central incisors  
spaces between the central and lateral incisors  
spaces between the incisor and canines  
spaces between molars

36. The one of the normal temporary teeth features position in dental arches are:

position without any inclination for all of teeth group  
position with vestibular inclination for upper incisors

position with oral inclination for lower incisors  
position with vestibular inclination for upper canines and molars  
position with oral inclination for lower canines and molars

## **Literature**

### **Main:**

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2. Golovko N.V. et al. Orthodontics. Occlusion development, diagnostic of malocclusion, orthodontical diagnosis. Poltava - 2008 - 95p.

### **Additional:**

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