

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 \_\_\_\_\_  
Head of department\_\_\_\_\_ L.V. Smaglyuk

**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 № 15	Etiology and pathogenesis of tooth-jaw-facial abnormalities and deformities. Definitions "anomaly", "deformation", "congenital", "acquired", "hereditary".
Course	III
Faculty	Preparation of foreign students

Poltava 2016

**1. The relevance of the topic.** Knowledge of etiological factors and pathogenesis of malocclusions, it is necessary to formulate a correct diagnosis, select the most rational method of treatment, which will lead to a stable result and no relapse of the disease.

## **2. Specific objectives:**

To examine groups of factors that lead to development of malocclusions.

To determine the factors those contribute to development of malocclusions in the antenatal period.

To determine the factors those contribute to development of malocclusions in postnatal period.

To study the classification of harmful habits by Okushko.

To explore the risk groups for the development of malocclusions.

To study the methodology of forecasting development of malocclusions by Lepors'ka.

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

Name of previous disciplines	Skills
1. Histology	Histological structure of bones, muscles, connective tissues.
2. Anatomy	To determine the period of the child development, the proportionality of body parts during this period of child development. To determine the places of muscles attachment, their functions, degree of functional disorders. To know the structural features of the facial skeleton, jaws.
3. Medical biology	The mechanisms of inheritance of pathological conditions.
4. Pathological physiology	Mechanisms of deformations of maxillofacial system development under influence of different etiological factors.

## **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. Norm	(lat. norma – "rule") is a regulatory rule that specifies the boundaries of its application; corresponds to something typical

	or usual, that occurs in a natural way and does not cause health problems.
2. Anomaly	(gr. abnormality) abnormality, an aberration from the general pattern.
3. Deformation	(from lat. deformatio "distortion") – change the size and shape of a rigid body under the action of external forces or other effects.
4. Congenital disorder	A condition exists at or before birth regardless of cause. Of these disorders, those characterized by structural deformities are termed "congenital anomalies" and involve defects in a developing fetus. Birth defects vary widely in cause and symptoms. Any substance that causes birth defects is known as a teratogen. Some disorders can be detected before birth through prenatal diagnosis (screening).
5. Acquired disorder	Changes the size and shape under the action of etiological factors.
6. Hereditary disorder	Disorders caused by disturbances in the processes of storage, transmission and realization of genetic information.

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

1. The definition of "norm" in orthodontics.
2. The definition of the terms "anomaly".
3. The definition of the terms "deformity".
4. The definition of "congenital disorder".
5. The definition of "acquired disorder".
6. The definition of "hereditary disorder".
7. Groups of factors that lead to the development of malocclusions.
8. The factors contributing to the development of malocclusions in the antenatal period.
9. The factors that lead to the development of malocclusions in postnatal period.
10. Classification of harmful habits by Okushko.
11. Forecasting, by L. malocclusions by Lepors'ka.

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

1. Determination of risk factors for the development of malocclusions.
2. Determination of the pathogenesis of the malocclusions development.
3. The definition of risk groups for malocclusions development.
4. Definition of forecast of malocclusions occurrence.

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

Development of dento-maxillary anomalies and deformities contribute to various factors, both local and general, but most of all is the connection of several

factors. Depending on their mechanism of action is divided into three groups:

- Hereditary;
- Acting in utero (antenatal);
- Acting after birth (postnatal).

In addition to inheritance, or those or other illnesses a child can inherit from parents or close relatives of features of the skull (the type of face, the size of the jaws and their location, number, size, shape of teeth, etc.).

The second group of factors leads to the formation of congenital defects and dento-maxillary anomalies of the face.

The third is – acquired malocclusion. The first two groups of factors are poorly studied.

By postnatal factors that contribute to the development of dento-maxillary anomalies and deformities include the following:

1. Improper feeding of artificial.
2. Long-term use of pacifiers.
3. Disease of early childhood - displacements of rickets.
4. A disturbance in the timing of teething.
5. Edentia.
6. Supernumerary teeth.
7. Impacted teeth.
8. Absolute or relative (individual) makrorentiya.
9. Mikrorentiya.
10. Disruption of the dentition:
  - Sucking;
  - Closing of the lips;
  - Breathing;
  - Chewing;
  - Swallowing;
  - Speaking.
11. Violation of myodynamic balance muscles that surround the tooth rows.
12. Violation of constitution: stoop, lordosis, kyphosis, scoliosis.
13. Multiple carious destruction of the approximal surfaces of teeth.
14. Early loss of temporary or permanent teeth.
15. Dysfunction or disease of the TMJ.
16. Injuries to the maxillofacial region.
17. Inflammatory and neoplastic diseases of the jaws.
18. Shortened lips (mostly upper).
19. Violation of the location and articulation of language.
20. Anomalies of the soft tissues attachment (frenulum, lips, tongue, small vestibule of the mouth).
21. Bad habits of sucking her nipples, fingers, lips, tongue, cheeks and foreign  
of subjects.
22. Pathological erasure of hard tissues of teeth.

23. Unequal erasure of hard tissues of temporary teeth.
24. Lack of physiological time erasing hard tissues of teeth.
25. Wrong pose-tonic reflexes.
26. The presence of adenoid growths.
27. Hypertrophy of the tonsils.
28. Upper respiratory tract infection.
29. Surgical interventions in the maxillofacial area.
30. Common diseases.
31. Ecological features of the environment.

Okushko in her classification only considers those kinds of habits that lead to the development of different types of malocclusions and distributes them into 3 groups:

I. Habit of sucking (recorded motor responses):

- 1) the habit of fingers sucking;
- 2) the habit of the lips, cheeks, subjects sucking and biting;
- 3) the habit of tongue sucking and biting.

II. Anomalies of the function (fixed functions which are not properly):

- 1) dysfunction of mastication;
- 2) incorrect swallowing habit and pressure of the tongue on teeth;
- 3) orally breathing;
- 4) improper speaking articulation.

III. Suspended posotonic reflexes that determine the correct position of the body at rest:

- 1) incorrect posture and body posture disturbances;
- 2) misuse of the lower jaw and tongue at rest.

Risk for dental disease:

1. Children born to mothers with extragenital pathology (malformations of the cardiovascular system, hypertension, nephropathy, diabetes, tuberculosis, toxemia of pregnancy, etc.).
2. Children of a parent is determined by the flow decompensated form of caries (III degree of activity).
3. Children who were born preterm.
4. Children who have suffered in the neonatal period and infancy hemolytic disease, pneumonia, purulent-septic diseases, rickets, hypervitaminosis D, more than 4 times ill respiratory diseases.

Working with young children begins with 3 years of age to determine etiological factors and the prevention of dento-maxillary anomalies involved in children's dentist and orthodontist.

Vinogradova invited to distribute the children who are subject to medical examination into three groups depending on the number of examination per year (1 - 2 - 3), and five health groups. The grouping of health was treated as follows:

Group I – healthy children, who rarely get ill.

Group II – healthy children burdened biological and social history, often (4 times or more per year), or acute illness lasted ill or at risk for chronic diseases.

Group III – children with chronic illness or congenital defect in the condition of compensation (with rare and severe exacerbations, without the explicit violation of the general condition and well-being), with occasional intercurrent disease.

Group IV – children with chronic illnesses and developmental disabilities are able to subcompensation (with frequent severe exacerbations not the underlying disease, in violation of the general condition and state of health after the aggravation) with a prolonged period after reconvalescent intercurrent disease, and with marked signs of immaturity.

Group V – children who suffer from serious chronic diseases, with severe developmental disabilities in the stage of decompensation, that is, the threat of disability and the disabled.

As in the selection criteria for the division of children's dispensary groups of Vinogradova not identified risk groups which are essentially transitional forms between health and pathology compensated. The risk of dental disease is reflected by the letter "P".

Snagina (1978) proposed to distribute risk factors for children with dento-maxillary anomalies in the two groups differ in the degree of rehabilitate of pathology bite.

The first group (risk of anomalies – RA) is represented by seven factors, which are called facilitators, which can be complicated by an anomaly in the development of the small number of cases even in the absence of preventive measures:

- 1) abnormalities of soft tissue attachment to the alveolar bone;
- 2) the defect of dentition in the extraction of one tooth to the top of the root resorption;
- 3) lateral teeth with caries destruction of the contact or occlusal surfaces;
- 4) violation of timing and sequence of temporary teeth changes;
- 5) the disease of vision, which are caused by changes in the shape of orbit (nearsightedness), which is often associated with the deformation of the lower jaw;
- 6) rickets (in history), and chronic medical conditions;
- 7) heredity.

The next group consists of children with active current causes of anomalies, not the removal of which is complicated by malformations in most cases. The presence of these factors is called "pre-anomalies" or "state of operational

readiness" to the development of the anomaly. Pre-anomalies labeled as PA and they are as follows:

- 1) dysfunction of mastication;
- 2) dysfunction of swallowing;
- 3) violation of the respiratory function;
- 4) children's bad habits;
- 5) the late eruption of temporary teeth after 4 years, complicated by block cusps canines and molars;
- 6) the earliest dates of the roots physiological resorption, extraction of two or more adjacent teeth, trauma, surgery and inflammatory diseases, which have carried out an impact on the development and growth of jaws and soft tissues of the site (scars, etc.);
- 7) violation of the musculoskeletal system and posture.

Between risk factors and pre-anomalies there are differences that are important for prognosis and to determine the tactics of orthodontist. At first, the likelihood of low anomalies and dental function is a personal observation, involving the cooperation of specialists, with or without the need of emergency assistance. In the other – the development of the anomaly is almost mandatory and dental function is to provide active assistance – normalization of the disturbed functions, eliminate bad habits, grinding of teeth, posture correction, preventive maintenance, dentures, orthodontic appliances purpose of prevention, etc.

Since the inspection of all children, and accordingly, the mass and prevention of dento-maxillary anomalies orthodontists complex as a result of staffing – the number is 8 times smaller than the children's dentists, these functions may be performed last. Because children under the supervision of a dentist are children with RA and PA, and the orthodontist provides directions for children's dental check-up of children, to carry out the instrumental treatment and preventive dental prosthetics.

Lepors'ka based on a study of influence of etiological factors on the growth of the face and bite the formation of the children developed a methodology for predicting the likelihood of malocclusion. In this case there are two such areas:

1. Forecast the probability of occurrence of malocclusion in a child as a result of connection of the pathogenic factors at the time of the survey (situational forecast).
2. Forecast of development of dental system for some time, which occurs in certain conditions. The table lists the prognostic factors of dento-maxillary anomalies. Knowing these factors, a doctor by the formula can determine the prognosis of dental anomalies.

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

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

1. To draw the table of harmful habits classification by Okushko;
2. To draw the table of harmful habits classification by Lepors'ka.

B. Tasks for self-control:

1. Depending on the mechanism of action, external etiological factors are divided into such number of groups:

three

one

two

four

five

2. To the child, from parents or relatives, not inherited:

systemic enamel hypoplasia

type of entity

dimensions of the jaws and their location

number of teeth

size and shape of the teeth

3. Factors of acting during fetal development, leading to:

innate malocclusions and abnormalities of development

acquired malocclusions

inherited malocclusions

deformation of the bite

premature birth

4. Postnatal factors lead to:

acquired malocclusions

innate malocclusions

inherited, malocclusions

the defects

premature birth

5. Classification of children's bad habits proposed by:

V. P. Okushko

F. Y. Khoroshilkina

L. P. Zubkova

B. D. Leporsky

E. I. Ilyina-Markosian

6. The first group of bad habits include:

habit of sucking

parafunction of the tongue

violation miodynamic balance

violation of masticatory function

violation of posture



7. The second group of bad habits include:  
anomalies of the functions or functions that occur wrong  
the habit of sucking  
violation miodynamic balance  
violation of posture the wrong posetonic reflexes  
mechanical habits

8. The third group of bad habits include:  
fixed posetonic reflexes that determine an incorrect position of body parts at rest  
habits of fingers, cheeks, pacifier sucking, biting of the lower lip  
anomalies of the function (fixed functions that are not properly occur)  
the habit of thrusting the tongue between the dental arches  
mechanical and chemical habits

9. Prognostic factors for determination of dento-alveolar anomalies'  
developed probability occurrence:

L. B. Leporska  
F. Y. Khoroshilkina  
L. P. Zubkova  
L. I. Ilyina-Markosian  
V. P. Okushko

10. Lordosis, kyphosis, scoliosis refers to:  
fixed posetonic reflexes, which determine the incorrect position of body parts  
anomalies of function which determines an incorrect position of body parts  
violations of miodynamic balance, which affects the wrong position of body parts  
the habits of correlations that affect the wrong position of body parts  
mechanical and chemical habits, which affect the incorrect position of body parts

11. A bad habit of putting a fist under the chin refers to a group (for V.P. Okushko):

third  
first  
second  
first and second  
only the first

12. The nail-biting refers to a group (for V.P. Okushko):  
first

second  
third  
first and second  
only the first

13. What is localization of multiple dental caries can lead to shortening of the dentition:

aproximally surfaces  
chewing surfaces  
in the cervical region  
cutting surfaces  
cavity of class 5 by Black

14. To anomalies of soft tissues attachment of the oral cavity do not include:

recession of the gums  
anomalies of frenulum of the upper lip  
anomalies of frenulum of tongue  
anomalies of frenulum of the lower lip  
small vestibulum of the oral cavity

15. Etiological factor in the supernumerary teeth development can be:

violation in the embryogenesis  
nature of power  
bad habits  
chronic osteomyelitis  
early removal of deciduous teeth

16. The most frequently factor of dentition defects occurrence is:

caries and its complications  
trauma  
hypoplasia  
fluorosis  
bad habits

17. Normal frenulum of the upper lip is attached in the following way:

5 mm above the gingival papilla  
to the gingival papilla  
at 7-10 mm above the gingival papilla  
above the vestibulum  
6-8 mm above the gingival papilla

18. In determining the strength of lips frenulum guided by the change in the:

interdental gingival papilla  
vestibulum

- attachment on lip
- vestibule of the oral cavity
- red border of the lips

19. In case of rickets as a factor of malocclusions development, your examination is:

- amount of vitamin D3 in the blood
- form of the dental arches
- form of the mandibular angle
- location of the frontal fontanel
- curvature of the lower legs

20. In case of impacted teeth as a factor of malocclusions development, your acting is:

- X-ray examination
- biometrics of control and diagnostic models
- anthropometry of the face
- determination of chewing efficiency
- photometry of the face

21. Absolute or relative macrodontia often contributes to the development of the next malocclusions:

- anomalies of the dental arches
- anomalies of occlusion
- anomalies of the jaws position relative to the base of the skull
- anomalies of jaw size
- anomalies of the shape of the dentition

22. The late eruption – disorders of:

- time of eruption
- anomalies of the dentition
- maturation of the dentition
- anomalies of the dentition shape
- anomalies of individual teeth

23. What is the localization of multiple dental caries may lead to a change in bite height:

- the occlusal surfaces of deciduous molars
- aproximally surfaces of deciduous molars
- cervical area of the tooth
- caries of cutting surfaces
- carious cavity class 5 by Black

24. Infantile type of swallowing is the physiological following a period of occlusion:

- first period of temporary occlusion
- period of permanent occlusion formation
- first period of the mixed occlusion
- second period of the mixed occlusion
- second period of temporary occlusion

25. Most often reason of malocclusion formation:

- heredity and early extraction of deciduous teeth
- early removal of deciduous teeth and dysfunction of breathing
- reduction of the roots of the teeth the mandible or maxilla and edentulous
- violation of function of speech and swallowing
- general somatic pathology on the background of inadequate growth of the jaws

26. Malocclusion is:

- improper development of teeth, dentition, jaws and soft tissues
- displacement of the dentition is influenced by endogenous and exogenous factors
- incorrect ratio on the first molars and the canines in the sagittal plane
- violation of the oral cavity functions under the influence of dental pathology
- wrong position of separate teeth, which led to aesthetic violations

27. Abnormal or pathological bite is:

- bite, with abnormal position of individual teeth, deformity of the dental arches or abnormal relation
- occlusion with abnormal position of individual teeth, and dysfunction of the oral cavity
- bite, with abnormal relation of dental arches as a result of wrong position of individual teeth
- bite, with abnormal an aesthetic and functional component that leads to the development of anomalies of individual teeth
- bite, with disrupts the relations in sagittal, vertical and horizontal planes

28. Occlusion is:

- closing of dentition in maximum contact with the teeth antagonists
- closing the first permanent molars and canines
- closing of the cutters with the right overlap
- closing of the fangs in the presence of multiple contacts between antagonists
- closing in the physiological rest with their maximum possible exposure

29. It is considered a pathological occlusion in which:

major morphological malocclusion lead to persistent disorders and facial aesthetics

significant morphological malocclusion lead to a significant offset on the first molar

significant morphological malocclusion lead to a significant offset on the molars and the canines

significant morphological malocclusion leading to displacement in all three planes

significant morphological malocclusion leading to a significant deformation of dentition

30. Deformation is:

progressive, over time, changes in the size or shape of the body under the influence of external or internal factors leading to dysfunction

progressing, over time, changes in the size or shape of the body, leading to disturbances in shape of teeth, dentition and alveolar bone

progressing, over time, changes in the size or shape of the dentition under the influence of external or internal factors, which leads to a curvature of curve of Spee

progressing, over time, changes in the size or shape of the dentition under the influence of external or internal factors that leads to the development of the phenomenon of Popov-Godon

progressing, over time, changes in the size or shape of the dentition under the influence of external or internal factors, which leads to disruption of dentinogenesis

31. The formation of prognathic occlusion not assist such habits:

mouth breathing

thumb sucking

biting the lower lip

mixed respiratory;

putting a fist under the cheek during sleep

32. In the infantile type of swallowing, the tongue pushes off from:

closed lips

alveolar bone

hard palate

upper frontal teeth

lower front teeth

33. The etiological part of the diagnosis is made on the basis of data  
clinical examination

x-ray studies

photometric studies

biometric research  
anthropometric studies

34. To determine of the following factors is most likely in the development of cross bite:

not abrasion cusps of milk molars  
mouth breathing  
biting the lower lip  
biting tongue  
infantile type of swallowing

35. In violation of the formation of dental system of the fetus play an important role such external factors:

compression of abdominal wall tight clothing  
duration of daylight  
temperature of the environment  
mode of work and rest  
duration of a meal

## **Literature**

### **Main:**

1. Fleece P.S. "Orthodontics". -Kyiv, MEDICINE, 2008, - 24-39 p.
2. Golovko N.V. et al. Orthodontics. Occlusion development, diagnostic of malocclusion, orthodontical diagnosis. Poltava,- 2008, - 28-86 p.

### **Additional:**

1. Pubmed. – Режим доступу: <http://www.ncbi.nlm.nih.gov/pubmed/>
2. Google Scholar – Режим доступу: <https://scholar.google.com.ua/>
3. BASE. – Режим доступу: <https://www.base-search.net/>
4. European Journal of Orthodontics. – Mode of access: <https://academic.oup.com/ejo>
5. Angle Orthodontist. – Mode of access: <http://www.angle.org/?code=angf-site>
6. Baumrind S, Frantz R.C The reliability of head film measurements.
7. Tracing superimposition// A.J.O.: 1976 :70:617-629
8. <https://books.google.com.ua/books?id=9CRcCwAAQBAJ&pg=PA34&lpg=PA34&dq=Etiology+and+pathogenesis+of+malocclusions&source=bl&ots=GAJA9Nhs2i&sig=YQQivddWmz2lDl14kwzaOTGlC5g&hl=uk&sa=X&ved=0ahUK EwiUusWn8-nSAhViEpoKHQKqB08Q6AEIVDAH#v=onepage&q=Etiology%20and%20pathogenesis%20of%20malocclusions&f=false>
9. <https://www.slideshare.net/hemamssingh/etiology-of-malocclusion-26607125>
10. <http://www.1800dentist.com/causes-of-malocclusion/>
11. [https://link.springer.com/chapter/10.1007%2F978-0-387-22427-5\\_4#page-1](https://link.springer.com/chapter/10.1007%2F978-0-387-22427-5_4#page-1)
12. <http://www.vjo.it/wp-content/uploads/2011/09/Syndromic-Malocclusions.pdf>