

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

Approved
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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 №2	Anomalies and deformation of dento-jaw region.
The theme of the lesson № 6	Sagittal malocclusion. Distal bite. Etiology, pathogenesis, prophylaxis.
Course	IV
Faculty	Preparation of foreign students

Poltava 2017

1. The relevance of the topic. Sagittal malocclusion is a common pathology of dental system, which presents certain difficulties in the treatment. Elimination of morphological violations does not always contribute to the change of facial aesthetics and restoration of disturbed functions. Therefore, knowledge of the causes contributing of the distal occlusion development, characteristics of their clinical presentation, diagnosis, treatment and prophylaxis in different age periods are important in the preparation of the orthodontist.

2. Specific objectives:

To determine the causes those leads or contribute to the distal bite development;
 To make a diagnosis of the distal malocclusion according to different classifications;
 To know the advantages and disadvantages of distal malocclusion different classification;
 To make an etiological part of diagnosis for the distal malocclusion.

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

Name of previous disciplines	Skills
1. 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.
2. Roentgenology	Based on the lateral cephalometric analysis to determine the form of distal occlusion.

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
Sagittal plane	the plane passes from front to back and divides the face into two halves.
1. Distal occlusion	is the prognathic correlation between the dental arches, which may arise as a result of different interrelations between dento-gnathic apparatus elements, and also location of the apparatus in the cranium.

4.2. Theoretical questions to the lesson:

1. Guidelines of malocclusion describing in a sagittal plane.
2. The definition of "distal form of the bite".
3. Factors contributing to the development of distal bite various forms.
4. The pathogenesis of distal bite various forms.

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

1. To make a diagnosis of the distal bite according to different classification;
2. To make an etiological part of diagnosis for the distal malocclusion;
3. To make a clinical examination of patients with distal bite;
4. To determine the etiological factor of distal occlusion formation;
5. To describe a pathogenesis of distal occlusion formation.

The content of the topic:

Distal (posterior) occlusion is referred to sagittal occlusion anomalies and is characterized by a great variety of clinical forms and presentations.

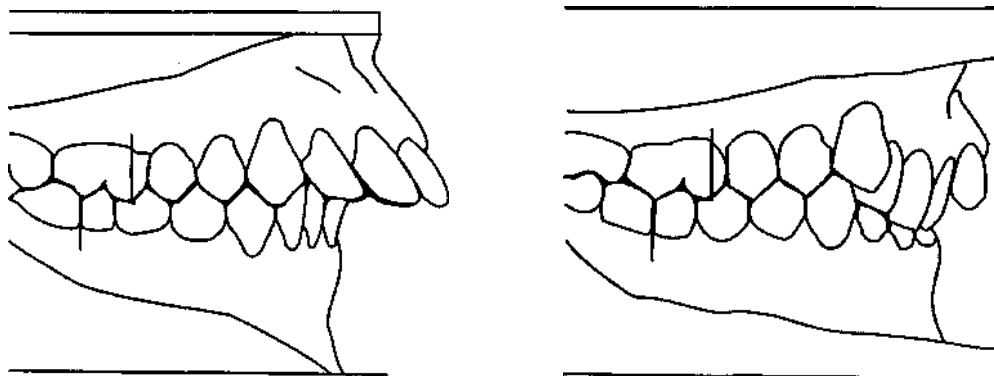
The type of occlusion, at which the upper jaw is protruding excessively, was described for the first time in 1886 by V.V. Dementyev, and in 1889 Sternfeld applied the term "prognathism", which has been widely used in orthodontics ever since. The term "posterior occlusion" was introduced by Licher in 1926, and now it has a lot of synonyms in literature: the 2nd class, anomaly of the 2nd group, posterior occlusion, distal bite, etc.

Posterior occlusion is one of the most widespread anomalies and makes on average from 3.6 to 65 % of all the types of pathologic occlusions. The given data is rather variable, which is explained by the absence of a single technique of examination and criteria difference in the diagnostics of dentognathic anomalies.

Posterior occlusion cases frequency varies in age aspect as well, but, according to many scholars, it takes place in the period of transitional dentition occlusion most often – from 15 to 20 %. This is explained, on the one hand, by unstable relative physiological equilibrium of the dentognathic apparatus in the period of transitional dentition, and on the other hand, by the fact that some anomalies in the period of mastication apparatus final formation disappear as a result of self-recovery.

The clinical symptom of posterior occlusion is the prognathic correlation between the dental arches, which may arise as a result of different interrelations between dentognathic apparatus elements, and also location of the apparatus in the cranium.

Thus, Angle in his anatomico-morphological classification refers the prognathic correlation between the dental arches to 2nd class anomalies, when the lower 1st molars are located distally relative to the upper ones. Angle considers this correlation to be caused by the lower jaw as the only movable bone of the facial skeleton. The author singles out two varieties of the 2nd class: 1) protrusion with frontal upper teeth diereses and 2) frontal part retrusion.



A.Y. Katz recommends taking into account the functional state of mastication muscles during dentognathic anomalies diagnostics. At prognathic jaws correlation the functional insufficiency of the muscles protruding the lower jaw (m. pterygoideus lateralis) takes place. He refers such dental arches correlations to 2nd group anomalies.

L.V. Ilyina-Markosian, diagnosing prognathic occlusion forms, offers taking into account lower jaw displacement at usual location. She refers prognathic dental arches correlation to sagittal occlusion anomalies, applying the term "posterior occlusion" and singling out its three varieties:

- without lower jaw displacement;
- with lower jaw displacement;
- mixed form.

D.A. Kalvelis takes account of etiological agents when diagnosing dentognathic anomalies. The author refers prognathism to sagittal occlusion anomalies, emphasizing its hereditary nature.

On the basis of etiological signs A. Kantorowicz singles out posterior occlusion arising because of the distal position of the lower jaw or the 1st molars during their eruption.

According to V.Y. Kurliandskyi classification, dental arches correlation anomalies are to be evaluated by the signs of underdevelopment or excessive development of jaws and their combination with normal development. Therefore prognathic dental arches correlation may be caused by excessive development of the upper jaw or lower jaw underdevelopment.

A.I. Betelman refers posterior occlusion to sagittal anomalies and depending on the jaws development degree singles out four clinical forms:

- 1 – lower micrognathia;
- 2 – upper macrognathia;
- 3 – upper macrognathia and lower micrognathia;
- 4 – upper prognathism with narrowing in the lateral parts.

S.I. Kryshab offered a pathogenetic classification of sagittal lower jaw deformations. It is based on the degree of the articular process, as the center of lower jaw longitudinal growth, being included into the pathologic process, and divided this deformation into two nosologic groups: condylar and extra-condylar. The author considered typical of condylar ones to be characterized by jaws bodies underdevelopment, and of supracondylar – alveolar process reduction.

In recent years cephalometric is widely used in the diagnostics, prognosis, and choosing the method of treating an orthodontic pathology. Cephalometric is used as an additional investigation method, which allows characterizing facial skeleton growth peculiarities, localization, patient's individual profile.

A. EI-Nofeli (1964), analyzing cephalometrics data, singles out two forms of posterior occlusion:

- 1) dental posterior occlusion with normal correlation of facial elements;
- 2) skeletal posterior occlusion with pathologic correlation of facial elements.

A.M. Schwarz (1969) and F.Y. Khoroshilkina (1976) during studying lateral head cephalometrics detected three basic forms of posterior occlusion: dento-gnathic, gnathic, and combined.

A.S. Shcherbakov (1967) differentiates dento-gnathic and skeletal forms of posterior occlusion.

According to the WHO systematics (Geneva, 1968), posterior occlusion is represented in several chapters:

- jaw size anomalies (upper jaw macrognathia, lower jaw micrognathia);
- anomalies of jaws position relative to the skull base (upper jaw prognathism, lower jaw retrognathia);
- dental arches correlation anomalies (posterior occlusion).

Posterior occlusion may be caused by different etiological agents and be the consequence of many functional and morphological dento-gnathic apparatus damages. Heredity is of big importance in prognathism development. Studying twins, some scholars (Siemens, Praeger, Kantorowicz, Korkhaus, 1939) concluded that anomalies, including prognathism, may be inherited. Not only face type, but also jaw size and occlusion form may be alike. Prognathism is also caused by constitutional peculiarities of the organism, the state of the patient's reactivity to environmental factors influence.

Intrauterine factors are also significant in posterior occlusion formation, first of all that is mechanical fetal injuries. In the womb the fetus is in the amniotic fluid protecting it from shakings and strokes. Fluid quantity changes in different periods of intrauterine development – from 2 L (6 months of pregnancy) to 1 L (in the end of pregnancy). Increase in amniotic fluid quantity leads to amniotic pressure increase, which in its turn causes violations of fetal blood supply, and in case of its decrease may lead to pressure on different parts of fetus. Amniotic pressure on the fetus, tight irrational clothes of the pregnant woman, wearing high heels create unfavorable environment for the development of the embryo and fetus, which not infrequently causes occlusion anomalies.

At typical fetal position the upper and lower extremities are pressed to the face, and due to the high pressure of the amniotic fluid or mechanical pressure from outside there may appear a deformity or growth inhibition of the maxillofacial skeleton.

Schwarz considers that the ventral fetus position may lead to distal lower jaw position.

Special attention must be paid to the mother's level of health during

pregnancy. The influence of radioactive, pharmacological, and other external agents, hard working conditions, irrational unbalanced diet, metabolic disorder and endocrine glands dysfunction, injuries, early pregnancy toxemia may lead to dentognathic apparatus development deviations.

The parents' age, especially the mother's, at the time of child's birth, presence of hereditary, chronic, and specific diseases also mean a lot.

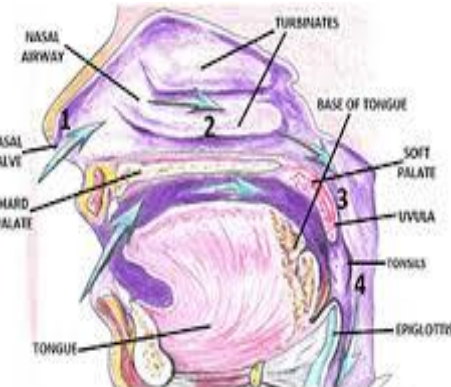
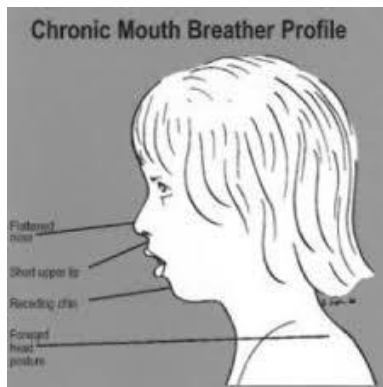
Posterior occlusion may appear at difficult prolonged labor. Obstetric intervention at abnormal labor (forceps or vacuum delivery) sometimes causes an injury of the dental germs or TMJ, which not infrequently leads to prognathism.

Etiological agents, arising as a result of extra-uterine agents influence, are the main ones causing posterior occlusion.

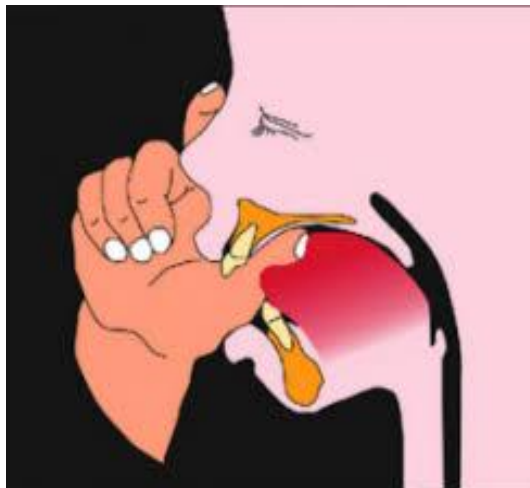
The character of child's feeding considerably influences jaws growth and development. A child is known to be born with distal lower jaw location (physiological retrognathia).

The function of sucking is a big load on the infant's mastication muscles. Due to the functional tension of muscles and intensive transfer of the lower jaw forward, by the end of the lactation period neutral position of jaws is noted. At artificial feeding lower jaw growth is inhibited and it takes the distal position, which leads to physiological retrognathia preservation. Artificial feeding from a bottle violates favorable functional irritation and the mastication apparatus is inhibited in its development: sucking movements do not require lower jaw displacement, mixture from the bottle pours into the infant's mouth, and rubber nipples cannot substitute natural feeding. The character of food also matters in posterior occlusion development. Feeding children with soft, grinded food, which does not require intensive mastication, develops mastication "laziness" in children. This leads to underdevelopment of the mastication muscles, which not infrequently causes underdevelopment of the lower jaw alveolar process.

Nasal breathing violation may be one of the reasons for prognathism. At mouth breathing the tongue changes its position – it is adjacent not to the palatine surfaces of the upper teeth, but to the lower teeth. Without inner tongue support the upper dental arch narrows from the sides, becomes elongated and protrudes in the frontal part. Negative pressure forms in the nasal cavity at nasal duct obstruction. As a result of reinforced drawing in of the air and constant pressure of the air flow from the side of the oral cavity high palate forms and dental arches form changes. Posterior occlusion formation is promoted by infantile diseases, especially rachitic. Vitamin D deficiency violates calcium and phosphorus metabolism. Bones become "soft" and are easily deformed. At that, growth zones activity is considerably disturbed.



Children's pernicious habits take significant place in prognathism etiopathogenesis. These habits include sucking fingers, tongue, lips, rubber nipple and other objects. All these habits exist in the period of occlusion formation and, acting for a long period of time, provoke bone deformation. For instance, thumb sucking cause's upper frontal teeth protrusion, excessive development of the interincisor bone because of mechanical pressure and trophism change on certain parts of the jaw bone. At that, the anterior part of the lower jaw is underdeveloped and flattened.



Head position during sleep is very important. If the head is thrown back, the lower jaw acquires the distal position as this increases the recoil of the muscles dislocating the lower jaw backwards. The tongue position and functional state also influence dental arches and occlusion formation. Posterior occlusion most often arises because of the slow growth and development of the lower jaw after an injury, chronic inflammation, congenital absence or death of dental germs, premature extraction of milk teeth, permanent teeth retention on the lower jaw, supplemental teeth on the upper jaw.

Materials for self-control:

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

1. To draw the types of distal occlusion.
2. To draw the types of distal occlusion according to different classifications.
3. To draw the tables of pathological types of the bite according to classification by Grigoryeva.

B. Tasks for self-control:

1. Prognathic bite is pathology in a plane:

sagittal
vertical
transversal
occlusion
lateral

2. Characterization of the sagittal plane is:

sagittal gap, the correlation of the canines and first permanent molars
(second temporary molars)
the depth of incisal covering, the size of the gap
the coincidence of bases of upper and lower lip, the coincidence of the
median line
lateral teeth correlation
frontal teeth correlation

3. Mandible retrogeny is physiological in the next period of occlusion:

newborn
stable temporary bite
involution of temporary bite
formation of temporary bite
there is no correct answer

4. What bad habits affect prognathic bite formation?

thumb sucking, lower lip biting, mouth breathing
finger sucking
upper lip biting
mixed breathing
putting the fist under the cheek during sleep

5. Angle's classification is based on this criterion:

the correlation of upper and lower first permanent molars
the correlation of upper and lower frontal teeth
the correlation of the upper and lower canines
the correlation of the upper and lower second temporary molars
the correlation of upper and lower first permanent premolars

6. Prognathic bite in Betelman's classification termed as:

distal
mesial
transversal
sagittal

upper

7. Prognathic bite in Kalvelis' classification termed as:

prognathia
anterocclusion
biprognathia
opisthognathia
distal

8. According to L.P. Grigorieva' classification there are such forms of prognathic bite:

neutral and distal
neutral and mesial
neutral and sagittal
neutral and vertical
neutral

9. The term "prognathic" corresponds to the symptom:

the presence of sagittal gap
the correlation of the canines
the correlation of the upper and lower frontal teeth in a vertical plane
the correlation of the first permanent molars
neutral bite

10. The term "distal" answers symptom:

the correlation of the first permanent molars
the presence of sagittal gap
the inclination of the lower anterior teeth
the inclination of the upper frontal teeth
neutral bite

11. Physiological retrogenia is:

posterior location of the mandible in relation to the upper
the neutral location of the lower jaw relative to the upper
anterior location of the mandible in relation to the upper
disgnathic location of the lower jaw relative to the upper
abnormal location of the lower jaw relative to the upper

12. Facial features of the prognathic distal bite:

smoothed nasolabial folds, a significant predominance of the upper lip over the lower, back chin position, increased angle of profile convexity
significant predominance of the upper lip over the lower
back chin position
increased angle of profile convexity

smoothed nasolabial folds

13. Define etiological factor in the formation of prognatia:

- mouth breathing
- lazy chewing
- tongue sucking
- biting his upper lip
- poor oral hygiene

14. Etiological factor of distal malocclusion could be:

- the oral type of breathing
- the shape of the teeth
- gender of the patient
- nationality
- violation of the teeth mineralization degree

15. The oral inclination of the lower incisors occurs as a consequence of:

- the pressure of the lower lip
- the pressure of the tongue
- the pressure of the upper lip
- the pressure of the cheeks
- the pressure of the maxillary sinus

16. Difference between prognathic distal and neutral bites is:

- the correlation of the first permanent molars
- the sagittal gap size
- the depth of incisal covering
- the absence of a sagittal gap
- the vertical gap size

17. Influence of rickets on the occurrence of distal occlusion, due to:

- disorders of mineral metabolism
- violation of mental health
- violation miodynamic balance
- violation of the image of a child's life
- decreased physical activity

18. Development of prognathic occlusion' gnathic forms is assisted by the following factors:

- distal position of the mandible with temporomandibular joint relative to the upper jaw and the plane of the base of the skull
- changes in the inclination of the upper incisors to the upper jaw plane
- change of lower incisors inclination to the mandible plane
- resize of incisors angle

increase in the basal angle

19. The symptom of "Lemon peel" is:

impairment of the lip clamping

large size of the teeth

tongue-tie

violation of respiratory function

poor hygiene of the skin

20. The function of circular muscle of mouth is:

sphincter, putting pressure on the teeth

elevates of mouth angles

pulls the mouth angles to the side

bare teeth when you smile

lowers the angle of the mouth

21. Forming a sagittal gap may be due to:

changes in the inclination of the upper incisors vestibular

change of inclination of the lower incisors vestibular

dentoalveolar shortening of the upper frontal teeth

dentoalveolar lengthening the lower frontal teeth

dentoalveolar lengthening the upper frontal teeth

22. Fan-shaped position of the teeth due to:

violation of miodynamic balance

violation of mental health

violation of mineral metabolism

violation of the image of a child's life

decreased physical activity

23. When distal occlusion change the inclination on canines occurs as a result of:

displacement of the lower jaw posteriorly in relation to the upper

displacement of the mandible anteriorly in relation to the upper

mesial displacement of the upper canines in the dental arch

distal displacement of the canines in the lower dental arch

lengthening of the front section of the upper jaw

24. A visiting nurse examined a newborn child. Examination revealed that lower face part is shorter than median one, chin is retrodeviated, teeth are missing, lower jaw is retrodisplaced. What is the name of such mandible position of a newborn?

physiological occlusion

mesial occlusion

physiological infantile retrogenia
distal occlusion
edge-to-edge occlusion

25. Prolonged use of pacifiers can lead to such a deformation of the bite:
narrowing and lengthening of the upper dental arch, distal position lower jaw
the flattening of the frontal section of the upper dental arch, anterior shift of the lower jaw
increase the depth of incisal overlap, distal position lower jaw
narrowing of the upper and expansion of the lower dental arch when properly the position of the lower jaw
narrowing of the upper and lower dental arches

26. What factor does not affect the establishment of the first permanent molars in the correct position:
degree of the teeth mineralization
formation of the Zelinskiy symptom
distal displacement of the mandible
early removal of the second milk molars
laying of the first permanent molars

27. Parents of an 8 year old boy complain about a cosmetic defect, inability to bite off food. The child often suffers from acute viral respiratory infections. Objectively: occlusion is early mixed period. The upper jaw is narrowed, there is gothic palate. Frontal teeth have fan-shaped position. Sagittal gap is 6 mm. In the lateral parts contact of homonymous teeth is present. What is the most probable cause of dentoalveolar deformity?
pathology of upper airways
missing of Zaelinski symptom
endocrinal diseases
untimely sanitation of oral cavity
gestational toxicosis

28. An infant was born full-term with body weight at a rate of 3200 g and body length at a rate of 53 cm. It was the first physiological delivery. What position of child's mandible is usually observed after birth?
physiological retrogenia
physiological progenia
direct relation
deep overbite
open bite

29. Preventive examination of a 6-year-old child revealed temporary teeth bite. Upper and lower dental arches are trapeziformed. Upper incisors overlap lower incisors more than by 2/3. Incisors and second molars are in the same relation. There is no space between frontal teeth. Upper dental arch is bigger than lower dental arch by the cheek tubercle size. Bite abnormality is observed in the following planes:

- sagittal and vertical
- sagittal and lateral
- sagittal and occlusal
- sagittal and nasal
- sagittal and Frankfurt

30. Preventive examination of a 5-year-old child revealed a habit of lower lip biting. What malocclusion may develop if the child keeps this habit?

- prognathic bite
- anterior bite
- open bite
- deep overbite
- cross-bite

31. Parents with an 8 years-old child appealed to the orthodontist with complaints on aesthetic anomalies and impaired chewing function. At external examination: smoothed nasolabial folds; the upper lip forward, lower lip protruding, it prints the upper front teeth; deep labial-chin groove; chin sloping back. Wide nose, flabby wings, dry red border of the lips. Prevention of mouth breathing is the following:

- timely advice of an ENT doctor
- improving the living conditions
- the changing of power nature
- improving the oral hygiene
- antenatal prevention

32. Parents with an 8 years-old child appealed to the orthodontist with complaints on aesthetic problems and impaired chewing function. On examination: sagittal gap of 6 mm, the relation of the canines and first permanent molars on the class II Angle. Etiological factor the occurrence of distal occlusion could include:

- biting the lower lip
- thumb sucking
- mouth breathing
- putting a fist under the cheek during sleep
- macroglossia

33. The pathogenesis of distal occlusion formation with the oral type of breathing is as follows:

lowering and displacement of the mandible posteriorly
retrusion of lower incisors
protrusion of the upper and lower incisors
protrusion of the upper incisors
lowering and displacement of the mandible anteriorly

34. To the orthodontist asked parents with a 4 years-old child. Sagittal gap of 3 mm, the relation of the canines and second temporary molars are distally. Upper incisors overlap the lower 1/3 height of the crown, in a state of protrusion. Function of what muscle groups determines the correct inclination of the incisors:

the circular muscle of the mouth
muscle lifting the corner of the upper lip
muscle lifting the lower lip
triangular muscle of the mouth
square muscle of the lower lip

35. Distal occlusion changes the relation of canines in the result of:
displacement of the mandible posteriorly in relation to the upper
displacement of the mandible anteriorly in relation to the upper
mesial displacement of the upper canines in the dental arch
distal displacement of the canines in the lower dental arch
lengthening of the front section of the upper jaw

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