

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

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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 №2	Anomalies and deformation of dento-jaw region.
The theme of the lesson № 8	Treatment and prophylaxis of distal bite.
Course	IV
Faculty	Preparation of foreign students

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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:

Treatment of the distal malocclusion according to different forms;

Treatment of the distal malocclusion according to different age;

Treatment of the distal malocclusion according to different periods of bite formation;

Different appliances for distal malocclusion treatment.

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
1. Sagittal plane	the plane passes from front to back and divides the face into two halves.
2. 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.
3. X-ray forms of malocclusion	Gnathic, dento-alveolar, mixed forms.
4. Profile of patient	Strait, concave, convex.

4.2. Theoretical questions to the lesson:

1. Peculiarities of distal malocclusion different forms treatment in a temporary, mixed and permanent occlusion;
2. Features of distal bite treatment in the period of the temporary teeth.
3. Features of distal bite treatment during the change of teeth.
4. Features of distal bite treatment in the period of permanent teeth.
5. Features of distal bite treatment in adolescents and adults.
8. Features of retention period in the treatment of various forms of distal malocclusion;
9. Determination of the complexity elimination of morphological and functional disorders degree in the treatment of distal malocclusion forms;
10. Orthodontic appliances that are used in the treatment of various forms distal malocclusion;
11. Design features and manufacturing orthodontic appliances for the treatment of various forms of distal bite.
12. Design features and manufacturing orthodontic appliances for retention of treatment results of various forms distal bite.
13. Determination of duration of retention period in the treatment of various forms distal bite.

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

1. To plan the treatment of distal malocclusion different forms;
2. To choose the rational design of orthodontic appliance for the treatment of various forms of distal malocclusion.
3. To choose the rational design retention apparatus;
4. To determine the prognosis of orthodontic treatment of distal malocclusion various forms;
5. To keep records of orthodontist.

The content of the topic:

Posterior occlusion treatment is a complicated task, which depends not only on the clinical form and degree of its expressiveness, but also on the patient's age.

The main efforts during posterior occlusion treatment are to be directed at:

- avoiding the inhibiting influence of dysfunctional lips, cheeks, and tongue muscles on jaws growth and formation;
- normalization of dento-gnathic apparatus functions – breathing, swallowing, speech, mastication;
- correction of teeth position, dental arches form, occlusion;
- stimulation of the growth of the dental arches apical bases in the parts of their growth inhibition;
- hampering upper jaw growth and stimulating lower jaw growth.

Posterior occlusion treatment in the temporary period consists in prophylactic measures and comes to creating conditions promoting the normal development of the child's dento-gnathic apparatus. At that, the oral cavity and nasal part of the pharynx are subject to sanitation. In this period great attention must be paid to myogymnastics by the technique of V.S. Kurylenko and Z.F. Vasylevska, aimed at strengthening the orbicular muscle of mouth and the muscles protruding the lower jaw. In some time skeletal muscles training may be included into complex treatment — using the well-known myogymnastics, worked out by Rodgers, and also Dass' apparatus. As the child adapts to treatment procedures, both prophylactic and treatment devices may be used.

Prophylactic devices:

- to prevent lower lip sucking and biting – a device on the lower jaw with and ages on the vestibular arch;
- to prevent finger or tongue sucking – a plate on the upper jaw with a wire or plastic protective shield.

To treat children with posterior occlusion, complicated with deep overbite, such treatment devices are used: Muelleman's propulsor or a plate on the upper jaw with an elongated inclined plane. The inclined plane is to be shaped from the palatine side from the frontal teeth necks at 45° angle for the advanced sliding of the lower incisors to the upper ones. It is expedient to use this device with a sling cap to keep the lower jaw in such position.

At prognathic occlusion, complicated with open bite, the normalization of the breathing and swallowing functions is emphasized. A vestibular mantel (Korbitz' plate) and Kraus' apparatus are used.

Frankel's devices of the 1st and 2nd type are used till the end of temporary period, till permanent teeth eruption. The 1st type – in patients with posterior occlusion combined with dental arches narrowing and frontal teeth protrusion. The 2nd type – in patients with posterior occlusion complicated with deep overbite.

Transitional dentition period is the most favorable for treatment, because it is the period of the most important development stages and dento-gnathic apparatus establishment. The transitional dentition process is accompanied by increased jaw growth; biological potency to growth is realized to the biggest extent. All this should be taken into account when choosing a treatment method and an orthodontic appliance of efficient design.

In the period of transitional dentition together with myogymnastics and fight against pernicious habits different designs of orthodontic appliances are widely used: Schwarz' plates with an inclined or biting platform (Fig. 168), Frankel's apparatus of the 1st and 2nd type, Kraus' apparatus, Muelleman's propulsor (Fig. 169).

At the underdeveloped lower jaw, accompanied by compression in the lateral parts, there are applied removable devices for lower jaw dilation, which allow influencing teeth and dental arches, alveolar process and jaw selectively.

Dankov's appliance is used at lower jaw distal position. Orthodontic treatment at upper jaw overgrowth mainly consists in changing the axial inclination of the upper frontal teeth, dental arch form change, dental arch shortening, inhibiting upper jaw growth by means of extracting the lower premolars at canine teeth coming out.

Axial teeth inclination may be changed with the help of removable appliances with a retracting arch. In cases of considerable incisors protrusion plastic bandages or hooks are welded on the vestibular arches to prevent arch sliding. To transfer teeth (incisors and canine teeth) orally and reduce spaces between them Osadchyi's or Aisenberg's appliances are used. At supraocclusion of the upper or lower frontal teeth biting platforms are used in the appliances.

To correct the form of the narrowed upper dental arch a screw or Koffin's omega loop is welded into removable devices. A device for treating posterior occlusion – a plate on the upper jaw, which combines the design peculiarities of Osadchyi's apparatus and Schwarz' plate with an inclined platform – is rather effective for these purposes. If it is necessary to dilate the dental arch, a screw or Koffin's loop is welded into it.

In most patients with posterior occlusion the united form prevails, i.e. lower jaw underdevelopment and upper jaw overgrowth, with the narrowing of one or both jaws. Such patients are treated taking into account morphological and functional peculiarities: jaws development degree (basal and alveolar arches), their location in the skull, jaws location relative to one another, dental arches narrowing and teeth axial inclination (especially of the frontal ones) degrees. For this purpose the above mentioned devices are used, and also Andresen-Haupl's, Aisnworth's, Mershon's devices, Bimler's occlusion former (A and B types), intermaxillary recoil.

In the period of permanent occlusion instrument treatment is rather complicated and is accompanied by recurrences at older age, as stable articulation equilibrium has already appeared, constant myotatic reflexes have established, and the bones of jaws, articular, coronoid, and alveolar processes have lost the capacity to significant plastic transformations. The most expedient treatment methods in this period are the usage of mechanical action devices, brackets in particular. In such cases orthodontic treatment is combined with surgical preparation. It is rather difficult to change the axial inclination of the upper frontal teeth at a big sagittal gap (more than 5 mm) and spaces absence without individual teeth extraction (more often premolars) with subsequent transfer of canine teeth and incisors. At

macrognathia compact osteotomy is conducted for bone tissue plasticity increase and orthodontic treatment acceleration.

Surgical procedures are conducted in severe cases of posterior occlusion.

To accelerate orthodontic treatment and shorten its terms physiotherapeutic methods are widely used (vibration influence, vacuum therapy, electrophoresis, MRT), which give good results in combination with instrument treatment.

Thus, different forms of posterior occlusion are not treated by one method, but require individual approach in every single case. At that it is impossible to restrict influence to one jaw only, as in clinical practice there are almost no cases of an isolated anomaly of one jaw.

The treatment of distal occlusion various forms should be directed to:

- 1) Elimination of the inhibitory influence improperly functioning of the lips muscles, cheeks, tongue on the growth and formation of the jaws.
- 2) Normalization of oral cavity functions: breathing, chewing, swallowing, tongue, closing of your lips.
- 3) Delay the sagittal growth of the maxilla.
- 4) Encourage of the lower jaw growth.
- 5) Changes of the dental arches size and shape.
- 6) Correction of individual teeth position.
- 7) Stimulation of the apical basis growth in those areas where it is showing a delay.
- 8) Mesial displacement of lower jaw.
- 9) Correction of occlusion by height (assuming a combination with a deep bite).

For the treatment of distal occlusion forms are used following orthodontic appliances:

1. Standard vestibular shield or standard vestibular plate.
2. Custom-made vestibular shield.
3. Propulsor of Muleman.
4. Activator by Andresen-Haupl's.
5. The regulator functions Frenkel type i (FR-I , FR-S, FR-Ic).
6. Persin appliance.
7. Open the activator Klammt.
8. Plate for the upper jaw vestibular arch and the inclined plane.
9. Grigorieva-Smaglyuk appliance.
10. Bionator of Balters 1 view.
11. Bionator of Jansen.
12. Biting plate of Katz.

To increase the pressure on the frontal teeth by the F. Y. Khoroshilkina proposes to combine the use of functional devices with extra-oral thrust (vestibular shields, propulsor of Muleman, activator Andresen-Haupl's, etc.).

If any such indications as: individual macrodentia, family similar form of malocclusion, hypoplasia of the mandible or its apical base, marked the close position of the teeth and lack of space for some of them (usually the lateral incisors and canines) is an expedient extraction of premolars on the upper or both jaws.

Extraction of the first temporary molars with the beginnings of the first premolars at the age of 8.5 years, provides the change in axial inclination of the rudiments of permanent teeth and their distal offset by self-regulation the direction of least resistance (in place of the deleted first temporary molars and first premolars). This treatment is combined with massage (finger, vacuum, vibration or ultrasound).

Orthodontic treatment of adolescents and adults, mainly consists of two stages:

1. The normalization of the individual teeth position and shape of the dentition.

2. Restructuring of vertical relationships.

The third stage is the repositioning of the lower jaw were previously rare, are currently using interdental elastics it is widely used in the treatment with brackets.

Significantly reduce the time of orthodontic treatment of adolescents and adults allow application of compactosteotomy. Tape or perforated conduct of vestibular and oral sides of the upper jaw in the area of incisors. The orthodontic device applied on the 7th day after surgery with normal postoperative course.

With a view to maintaining the achieved results of the treatment (retention), it is possible to apply the apparatus, which was used in the period of active orthodontic treatment, but without activating it or specially made.

Materials for self-control:

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

1. To draw the appliances for distal occlusion treatment.

B. Tasks for self-control:

1. For differential diagnosis of distal bite forms next test is carried out:

Eshler-Bittner

Ilyina-Markosyan

Ghench-Shtange

Ziebert-Malygin

There is no correct answer

2. For the treatment of prognathic bite in temporary bite next orthodontic appliances are used:

- Muelleman's propulsor
- Gulyayeva's appliance
- Brukl's appliance
- Frenkel's function regulator type II
- Frenkel's function regulator type III

3. For the differential diagnostic of dentoalveolar and gnathic forms of prognathic bite is used:

- lateral cephalometry
- direct cephalometry
- occlusal radiography
- contact intraoral radiography
- panoramic X-ray

4. For the treatment of prognathic the following type of Frenkel' function regulator is used:

- I
- II
- III
- IV
- V

5. Distinctive features of the Andresen-Haupl' activator that used in the treatment of prognathic bite:

- inclined plane for lower jaw movement, vestibular arch
- vestibular arch
- inclined plane on the upper jaw
- inclined plane on the lower jaw
- inclined plane for upper jaw movement

6. For the treatment of II_2 the following type of Frenkel' function regulator is used:

- II
- I
- III
- IV
- V

7. What orthodontic appliances do not apply in prognathic bite treatment?

- Bynin's gum shield
- Muelleman's propulsor
- Andresen-Haupl' activator

Persin's appliance
RF -I

8. For the training of orbicular muscle of the mouth the following preventive appliances are used:

Dass's activator
lip's equilibrator
whistle
vestibular shield
all answers are correct

9. In the Frenkel's function regulator of the 1st type labial pellets are located in such way:

in the area of the lower lip
in the area of the upper lip
in the areas of both lips
absent
in the area of the premolars

10. The design of the Frenkel's function regulator of the 1st type includes such an arches:

vestibular maxillary and oral mandibular
mandibular vestibular
oral maxillary
oral maxillary and mandibular
absent

11. In the Frenkel's function regulator I buccal shields to stimulate the growth of apical bases is as follows:

distant from the maxilla alveolar process
adjacent to the alveolar processes of both jaws
distant from the alveolar processes of both jaws on 2,5 mm
distant from the mandible alveolar process
absent

12. The design of the Katz' bite plate includes the following elements:

plastic inclined biting plane and metal pressing loop
metal inclined biting plane
plastic inclined biting plane
metal biting plane
combined

13. According to the principle of action Katz' biting plane refers to appliance:

functionally-directing
functionally-active
mechanical action
combined
mechanical-directing

14. According to the mode and place of action Persin' appliance is:
onejaw of intermaxillary action
onejaw
two-jaws
extraoral
two-jaws intermaxillary action

15. What orthodontic appliances do apply in distal bite treatment?
Muelleman's propulsor
Bynin's gum shield
Brukle's appliance
RF-III
RF-IV

16. What orthodontic appliances do apply in distal bite treatment?
Andresen-Haupl' activator
Bynin's gum shield
Brukle's appliance
RF-III
RF-IV

17. What orthodontic appliances do apply in distal bite treatment?
Persin's appliance
Bynin's gum shield
Brukle's appliance
RF-III
RF-IV

18. What orthodontic appliances do apply in distal bite treatment?
RF-I
Bynin's gum shield
Brukle's appliance
RF-III
RF-IV

19. What orthodontic appliances do apply in distal bite treatment?
RF-II
Bynin's gum shield

Brakle's appliance
RF-III
RF-IV

20. 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: the upper jaw is narrowed, there is gothic palate. Frontal teeth have fan-shaped position. Sagittal fissure is 6 mm. In the lateral parts contact of homonymous teeth is present. What is the most probable cause of dento-alveolar deformity?

- pathology of upper airways
- missing of Caelinski ledge
- endocrinal diseases
- untimely sanitation of oral cavity
- gestational toxicosis

21. A child is 2,5 year old. The parents complain about thumb sucking during sleep. What tactics should the doctor choose?

- to recommend an ulnar fixator
- removable appliance for suppression of bad habit
- to talk with a child about harm from thumb suction
- medical intervention is unnecessary
- non-removable device for suppression of bad habit

22. A 12-year-old patient complains about an aesthetic defect. Objectively: the lower third of face is shortened, upper frontal teeth overbite the lower teeth by 3/3 of height, exhibit oral inclination, lateral parts all along exhibit cusp-to-cusp relationship between the antagonists; Angle's class II malocclusion (joining of the upper permanent molars) is also present. Malocclusion is observed in the following planes:

- in sagittal and vertical
- in transversal and vertical
- in transversal
- in vertical
- in sagittal

23. An 8-year-old child is found to have convex facial profile, forced closing of lips, sagittal gap of 7 mm. Eschler-Bittner test produces some face improvement. This abnormality can be eliminated by means of Frankel type regulator. What is the mechanism of this appliance action?

- normalization of labial, buccal and lingual pressure as well as of mandible position
- maxillary expansion by means of a screw
- inhibition of maxilla growth in the sagittal direction

normalization of mandible position and growth by means of intermandibular traction

normalization of upper front teeth position by means of a vestibular bar

24. A 10-year-old girl complains of an aesthetic flaw. The anamnesis states, that she had been sucking her right thumb up to the age of 7. Objectively: the face lower third is somewhat reduced. The sagittal fissure between the upper and lower incisors, is 9 mm wide, class 2 according to the Angle classification. Eshler-Bittner test leads to initial temporary improvement of the girl's face, followed by renewed deterioration. What clinical malocclusion is the most probable in this case?

mandibular micrognathia

maxillary macrognathia

maxillary macrognathia and mandibular micrognathia

maxillary prognathism with lateral compression

mandibular retrognathia

25. A 3,5-year-old child has symmetrical face, the middle part is predominant in proportions, swallowing is infantile, breathing is nasal. In the oral cavity the dentition corresponds with the age norms, the sagittal fissure is 3 mm, every tooth in the lateral part has its antagonist, the lower teeth touch the hard palate. Miogymnastics with Dass orbicularis oris activator is recommended. What function is normalized by this apparatus in the given case?

lips closure

breathing

chewing

swallowing

speech

26. Preventive examination of a 5-yearold 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

27. Changes in the size of the lower jaw of patients with prognathic bite:

decrease of sagittal sizes

increased of sagittal sizes

increase of transversal sizes

decrease of vertical size

decrease of transversal size

28. What orthodontic appliances do not apply in prognathic bite treatment?

Brakle's appliance
Muelleman's propulsor
Andresen-Haupl' activator
Persin's appliance
RF-I

29. What orthodontic appliances do not apply in prognathic bite treatment?
RF-III

Muelleman's propulsor
Andresen-Haupl' activator
Persin's appliance
RF-II

30. What orthodontic appliances do not apply in prognathic bite treatment?
RF-IV

Muelleman's propulsor
Andresen-Haupl' activator
Persin's appliance
RF-II

31. 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

32. 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

33. 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

34. 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

35. 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
flattening of the front section of the upper dental arch, anterior the 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

Literature

Main:

1. Fleece P.S. "Orthodontics". -Kyiv, MEDICINE, 2008, - 278-281p.

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>