

**LVIV NATIONAL MEDICAL UNIVERSITY N.A. DANYLO
HALYTSKY**

Department of Physical Training and Sports Medicine

Approved at the methodical meeting of
the department of Physical training and sports medicine
Head of the department

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GUIDELINES

in the discipline

PHYSICAL REHABILITATION AND SPORTS MEDICINE

for 3th year students

training of specialists of the second (master's) level higher education in the field of
knowledge 22 "Health" specialty 221 "Dentistry" for independent work in
preparation for practical classes

Topic 5 *“Physical rehabilitation during reconstructive and plastic surgeries in
the maxillofacial area. Physical rehabilitation for congenital anomalies of jaw
development and bite disorders for children.”*

LVIV-2023

Methodical guidelines are made in accordance with the requirements of the curriculum in the discipline "Physical Rehabilitation and Sports Medicine", compiled to train specialists of the second (master's) level of higher education in the field of knowledge 22 "Health" specialty 221 "Dentistry".

According to the curriculum, the study of physical rehabilitation and sports medicine at the medical faculty is carried out in the 3d year of study.

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Protocol № 18 from 16 of May 2023

1. Scientific and methodical justification of the topic.

Congenital defects of the maxillofacial area are accompanied by gross functional disorders of nasal breathing, speech and chewing. If you do not provide qualified medical care in childhood, then in the future, the patient will develop secondary deformations of the jaws and teeth, develop pathological changes in the nasal part of the pharynx, bronchi and lungs, possible deformation of the posture, as well as a delay in the psychomotor development of the child.

Surgical correction of these changes is carried out for a child up to 5-6 years old in two stages: 1st - preparation for surgery, operative intervention; 2nd - outpatient recovery of functional disorders. Children under 3 months of age are given massage and reflex exercises, which are based on unconditional skin-muscle reflexes (sucking reflex and reflexes that are accompanied by the extension of the trunk and limbs). After 4 months, passive exercises should be added to reflex exercises, and active ones from the second half of the year.

Surgical intervention is quite a traumatic factor for the child's body and even with the most advanced surgical technique, it is often accompanied by significant disorders and postoperative complications. A big problem in reconstructive operations of the maxillofacial area is the rejection and inflammation of the Filatov stem, as well as trophic disorders in the limb to which the stem has migrated.

From the first days of treatment, it is necessary to win the trust of the patient and his parents, in an accessible form, and clearly explain to them the need to independently repeat the prescribed drugs, which, accordingly, affects the effectiveness of complex treatment. The use of the biological essence of FR means, their availability and cheapness as part of the complex treatment of patients depends only on the awareness of dentists. The study will formulate the motivation, increase the professional responsibility of future doctors for the timeliness, adequacy and systematicity of the prescription of FR means to patients with congenital defects of the maxillofacial region at various stages of reconstructive operations.

Abnormalities in the development of the maxillofacial system are manifested by disturbances in the development of the teeth (eruption, their number, position, size, shape, structure) and jaws (congenital malformations, disorders of the growth of the jaws, their deformations, incorrect positioning of the jaws in the skull). Clinical deformations and changes in the dentition are characterized by changes in the sagittal, transversal, and vertical directions (simultaneous changes in several directions are possible).

In the case of bite anomalies, the physiological balance of the muscles around the mouth,

closing of the lips, functional changes in the masticatory muscles are disturbed, their tone and bioelectric activity are reduced, the functions of the tongue muscles are disturbed, and the normal relationship between the shape and function of the lips is disturbed. Violation of the function of the muscles of the maxillofacial area with bite anomalies is an important reason for the formation and progression of deformities. Violation of muscle coordination can also lead to disproportion of growth of the jaws and other bones of the skull. At the same time, there are changes in the nature of breathing (nasal-oral or oral breathing prevails), which leads to diseases of the upper respiratory tract. The degree of severity disorders of the functions of external breathing depends on the nature of the anomalies of the bite. Disruption of mastication in the case of bite abnormalities negatively affects the function of the digestive organs. Depending on the type of anomaly, the nature and degree of functional changes in facial muscles, masticatory muscles, impaired balance of the muscles around the mouth, speech is impaired. A characteristic feature of phonation disorder is hoarseness. With bite anomalies, in 70% of cases, the posture is disturbed, which is caused by a change in the position of the head and the movement of the center of gravity forward from the axis of the body, as well as weak physical development. Speech disorders, shape changes face, lag in physical development negatively affects the patient's psycho-emotional state, make him less communicative. The use of FR methods in orthodontics is due, on the one hand, to a targeted effect on the muscles of the maxillofacial area, which contributes to the normalization of both the form and function of the maxillofacial system, and on the other hand, to a general effect on physical development, the function of the circulatory system, respiratory organs and digestion, psycho-emotional sphere. FR means are most effective during periods of milk and alternating bites, when there is intensive growth of the dento-jaw system. Orthodontic and operative treatment of patients with anomalies of the dento-maxillary system is impossible without the use of FR means, since the elimination of only morphological changes does not contribute to the restoration of impaired functions. Discontinuation of FR classes leads to a decrease in the effectiveness of orthodontic and surgical treatment and the occurrence of recurrences of anomalies.

The study of this topic in the educational process of the future doctor will form motivation, increase professional responsibility for the timeliness, adequacy and systematicity of the prescription of FR drugs as part of the complex treatment of patients with disorders and anomalies of the bite.

Learning goal

The student should know:

- clinical and functional justification for the appointment of FR means to patients with congenital defects of the maxillofacial area at various stages of reconstructive operations.

- clinical and functional justification for the appointment of FR agents to patients with occlusal disorders and anomalies.

Be able:

-justify and independently prescribe the means of FR as part of the complex treatment of patients with congenital defects of the maxillofacial area at various stages of reconstructive operations;

- describe and demonstrate special exercises to parents and sick children.

-justify and independently prescribe FR drugs as part of the complex treatment of patients with occlusion disorders and anomalies;

- describe and demonstrate special exercises to parents and sick children

Master practical skills:

collect a general history;

be able to fill out a physical therapy office card;

be able to make a referral for treatment in a physiotherapy office;

to be able to determine the periods of various diseases;

to be able to determine movement modes;

about the mechanisms of the therapeutic action of FR agents and the peculiarities of their use as part of the complex treatment of patients with disorders and anomalies of the bite.

Tips for the student:

Functional disorders in congenital defects of the maxillofacial area:

Chewing disorder

Violation of nasal breathing, which ensures the stability of signals to the respiratory center (atmospheric air is cleaned, warmed and moistened)

Speech impairment due to reduction of the frenulum and hypertrophy of the tongue (the root of the tongue is overdeveloped and sinks into the pharynx, and its tip is underdeveloped and immobile)

Inflammatory diseases of the airways

Peculiarities of the use of FR means as part of the complex treatment children of early and preschool age:

Features of hardening:

From the first days of life, when swaddling and changing the child, touch with cool hands and leave the child naked for a short time

Continue hardening only if the child is in good health, the nose and limbs are warm, and there are no goosebumps."

During the illness, cancel the hardening procedure and after recovery start it all over again.

Allow the child to walk barefoot.

Peculiarities of using physical exercises in kindergarten age:

Take into account the level of physical and psychomotor development of the child, use toys during classes. Accompany the lesson with gentle words, soft melodic music, light stroking of the child's body.

Use reflex exercises that are based on unconditional skin-muscle reflexes (sucking reflex, reflexes accompanied by trunk and limb extension, swimming).

Passive exercises should be added to reflex exercises from the 3rd-4th month of life, and active exercises should be added in the second half of the year, when conditional connections appear. To conduct physical exercises in preschool and early school age in the form of sedentary, active or sports games in a group method (of the same age and the same psychomotor level).

Tasks of the FR in different periods of reconstructive operations for congenital defects of the maxillofacial area:

Preoperative period

Teach exercises for facial muscles, tongue, and soft palate;

Teach nasal and diaphragmatic breathing;

Reduce psycho-emotional stress about waiting for surgery;

Increase the functional capabilities of the body's life support system;

Activate the immune system and metabolism.

Early postoperative period (before removal of postoperative sutures):

Stimulate the resorption of postoperative tissue infiltration. Prevent rejection, inflammation

and thickening of transplanted tissues and the formation of adhesions.

Normalize blood circulation in the transplanted stem and the limb to which it is transplanted or from which it was transferred.

Stimulate the removal of narcotic substances from the body.

Restore the postoperative decrease in vascular tone, blood pressure, and microcirculation.

To normalize the muscle tone in the area of the postoperative wound.

Prevent blood clots.

Normalize ventilation disorders (due to deepening of breathing, reduction of residual lung volume, normalization of the drainage function of the tracheobronchial tree).

To normalize the tone and mobility of nervous processes, psycho-emotional state.

To prevent limitation of mobility of temporomandibular joints.

Stimulate the motor-evacuation function of the digestive and urinary organs.

Late postoperative period (after removal of sutures before discharge from the hospital):

Prevent thickening of transplanted tissues, promote stretching of created scars.

Restore speech and nasal breathing by improving the mobility of the lips and soft palate.

To restore the range of motion in the limb after its forced fixation for the migration of Filatov's stem.

Stimulate the postoperative decrease in the functional capabilities of life support systems.

The remote postoperative period (after discharge from the hospital from the 10th to the 14th day to 6 to 12 months):

Normalize the skills of nasal breathing, chewing, and speech. Prevent the formation of adhesions and scars in the area of the postoperative wound, and in case of formation, promote their resorption.

Stimulate the functioning of the body's energy supply system.

Contribute to the normal physical and psychomotor development of the child.

Means of FR, forms, methods and dosage of physical exertion:

Motion mode:

- depends on the level of psychomotor development of the child and the period of treatment;

- in a hospital - free, in outpatient conditions - gentle (under favorable conditions in preschool and junior school age)

Exercise:

- reflex, gymnastic, sports-applied, active and passive, respiratory (dynamic and static), ideomotor;

- prescribe depending on the level of psychomotor development of the child and the period of treatment

Forms of using physical exercises:

therapeutic gymnastics; sedentary, mobile, sports games; massage (manual, ice)

Methods of conducting classes:

- depend on the level of psychomotor development of the child and the period of treatment;

- under favorable conditions in preschool and junior school age -

complement the group method with independent classes (consultative method)

Intensity and duration of the total load:

- depend on the level of psychomotor development of the child and the period of treatment;

- corresponds to the functional capabilities of energy supply systems

Peculiarities of the use of physical exercises after reconstructive operations of the maxillofacial area:

Exercises for mimic and chewing muscles:

1. Perform at a slow pace, with incomplete amplitude, repeat 4-6 times in a row, at least 5 times a day

2. Exercises for the soft palate (participates in the act of swallowing, regulates air flow, actively affects phonation):

3. Gargling with warm water with the pronunciation of the sounds "gr-gr-gr", throwing the head back;

4. Pronunciation of the sounds "khr-khr-khr"; "ah-ah-ah"; "e-oh"; "eh-oh" with compressed nostrils;

5. Arbitrary raising and lowering of the palate in front of the mirror; arbitrary coughing with an open mouth, observing the movements of the palate in front of a mirror;

6. Repeat each exercise 5-8 times in a row at least 5 times a day

Palate massage:

1. Start from the 18th-20th day after the operation;
2. From the first days of the massage, perform stroking, rubbing and kneading with your fingers from front to back;
3. From the 5th to the 7th day of the massage, perform vibration with special vibromassagers

Filatov stem massage:

1. Start from the 3rd-4th day after removing the stitches;
2. From the first days of the massage, perform surface stroking, moving away from the leg(s) of the stem, towards the middle of the stem;
3. From the 3rd-4th massage procedure, carry out deeper stroking with stretching of the stem;
4. From the 2nd week, clamp the leg of the stem, which is to be cut off, with the fingers of one hand, and with the fingers of the other hand, squeeze the stem in the direction of the remaining leg;
5. After flattening the stem, perform a massage using classic techniques: stroking, rubbing, kneading, vibrations.

Evaluation of the direct effect of physical exercises under operational control to achieve the safety of classes and a positive cumulative effect:

In the early postoperative period

The total load should not accelerate the pulse by more than 10-15% of the level at rest.

Local loads (in the area of surgical intervention) should not cause pain in the area of the wound or (and) in the limb that is freed from a forced position or fixed during the migration of Filatov's stem.

In the late postoperative period

General exercise is adequate if it does not cause the heart rate to increase by more than 60-70% of the resting level.

Local loads (in the area of surgical intervention) should not cause pain in the area of the wound or (and) in the limb that is freed from a forced position or fixed during the migration of Filatov's stem.

1. Normal bite - full closure of the teeth

Physiological prognathia - the upper jaw moderately protrudes above the lower one.

Physiological progeny — the lower jaw moderately protrudes above upper.

Orthognathia — completely matching upper and lower teeth (standard of normal bite).

Ontogeny, or direct bite, is the marginal closing of the incisors and the cusps of the same name on the upper and lower lateral teeth.

Bipognathia is a simultaneous forward deviation of the upper and lower front teeth.

Ophistognathia is a simultaneous tilt back (orally) of the upper and lower front teeth.

2. Anomalies of bites - complete closure of the teeth is absent

2.1. Sagittal - violation of teeth closing in the anteroposterior direction.

Pathological prognathia (distal bite) - the upper tooth row protrudes above the lower one or the lower one moves back. It is accompanied by disturbances in biting, chewing, and articulation.

Pathological progenia (mesial bite) - the lower tooth row protrudes forward relative to the upper one, the dimensions of the lower jaw are increased (true progenia). Accompanied by violations of biting, chewing, articulation, breathing:

- frontal progeny — only the incisors of the upper jaw protrude above the lower ones, the upper lip noticeably sinks ("senile appearance")
- forced progeny — as a result of some inconvenience during closing the teeth, the face acquires a capricious appearance

2.2. Transverse — with narrowing or widening of the tooth rows on one or both sides, lateral displacement of the lower jaw or their combination (crossbite):

- one-sided — reverse closing of the front and side teeth;
- bilateral - reverse closing of the lateral teeth and correct — of the front teeth;
- noticeable asymmetry of the face

2.3. Vertical — violation of the closure of the tooth rows relative to the horizontal plane:

- deep bite - the front teeth significantly overlap the crowns of the lower ones, and the alveolar processes in the lateral ones are underdeveloped, their crowns are low, the lower part of the face is reduced
- open bite — there is a large gap between the rows of teeth (more often in the front), the

lower part of the face is elongated, the tongue is contained in the gap between the teeth (especially during a conversation)

3. Causes of bite disorders and anomalies

Artificial feeding, especially from a bottle with a long nipple and a large hole in it (sucking movements are weak, uneven in amplitude, the tone of the masticatory muscles and the perioral muscle is reduced). Loose, unclosed lips do not put enough pressure on the upper incisors, which deviate forward due to greater pressure of the tongue, as a result of which a prognathic bite develops.

Harmful habits: sucking fingers, tongue, various objects, biting the lower lip, pressing the tongue on the front teeth of the upper jaw, sleeping on the back with the head thrown back or bent on the chest, on one side with the hand placed under the cheek, resting the chin on the hands.

Disturbance of nasal breathing with adenoid growths and tonsillitis.

Congenital ridges of the maxillofacial area: changes in the size of the tongue, its tone and position in the mouth, muscle tone of the upper lip.

Acquired defects of the maxillofacial region: injuries, burns, inflammatory processes, early operations for cleft palate, tooth loss, rickets.

4. Functional disorders with bite anomalies

Disturbance of nasal breathing, which is supplemented or replaced by oral breathing.

Violation of the act of chewing.

Speech disorders, as a result of which lisp, hoarseness, hoarseness develop.

Hyperventilation of the lungs due to an increase in frequency and depth breath.

Secretory and motor-evacuatory disorders of the digestive organs, accompanied by morphological changes in them.

Disturbance of posture caused by a low level of physical development, a change in the position of the head and the center of gravity relative to the axis of the body.

Overstrain of the neck muscles, as a result of which the normal development of the trachea is disturbed.

Violation of psycho-emotional state and sociability.

5. Special tasks of the FR

Restoration of nasal breathing.

Normalization of biting, chewing, swallowing.

Restoration of speech.

Stimulation of the growth of the jaws in case of underdevelopment or its delay in case of their excessive development.

Strengthening of the muscles around the mouth, as well as the muscles that extend and lift the lower jaw, palate, oral cavity, and tongue.

Normalization of the position of the jaws.

6. General tasks of the FR

Restoration of the secretory and motor-evacuation function of the digestive organs and prevention of structural changes in the gastric mucosa.

Normalization of the breathing pattern by deepening and reducing its frequency and preventing inflammatory processes of the respiratory tract.

Stimulation of functional capabilities of respiratory organs. Normalization of posture, strengthening of neck and back muscles.

Normalization of the psycho-emotional status of the patient, dynamic processes in the cerebral cortex and corticovisceral relationships.

7. Features of using physical exercises:

7.1. General development (it is necessary to take into account the level of physical and psychomotor development of the child):

- gymnastic, sports-applied, game, reflex, which develop strength, flexibility, speed and dexterity;
- in the form of therapeutic gymnastics, games (moving and sports), swimming, bathing, massage;
- method of classes — mostly group and small group;
- load intensity — start with the maximum pulse acceleration during load to 110-120 per 1 min and gradually increase to 120-140 per 1 min;
- duration of classes — 30 minutes 2 times a day, daily for 2-3 months to 1 year or more;
- cessation of classes leads to a decrease in the effectiveness of complex treatment and the

risk of recurrence of abnormalities.

7.2. **Special** - perform series of 4-6 exercises with repetition of each movement 10-15 times or more during classes general-developing exercises, under the supervision of adults (so that they do not turn into bad habits).

With pathological prognathia (distal bite) for:

- circular muscle of the mouth;
- cheek muscles;
- lateral pterygoid muscle;
- normalization of swallowing

With pathological progeny (medial bite) for:

- tongue muscles;
- normalization of swallowing;
- normalization of nasal breathing

With a deep bite in the vertical direction for:

- chewing muscles;
- normalization of swallowing;
- tongue muscles

With an open bite in the vertical direction for:

- normalization of nasal breathing;
- circular muscle of the mouth;
- tongue muscles;
- chewing muscles;
- facial muscles

8. Special exercises

8.1. To restore nasal mucus breathing (contradicted in the presence of mechanical obstructions to breathing through the nose: hypertrophy of the nasal concha, nasal polyps, adenoid growths, curvature of the nasal septum and are performed only after surgical treatment).

Inhale through one nostril, prolonged exhalation through the other. Slowly exhale through the

nose onto the back of the palm or a piece of paper with a gradual increase in distance.

Prolonged and intermittent pronunciation of the sounds "m", "mu", "nu" with the mouth closed.

Prolonged and rhythmically intermittent exhalation through the nose, pressing one nostril with the thumb and rhythmically pressing the second with the index finger.

Intermittent inhalation (in spurts) through one nostril. Self-massage of the wings of the nose

8.2. For the muscles of the tongue (especially important when open vertical bites):

Sticking out the tongue and licking the lips with a half-open and open mouth.

Raising the tip of the tongue to the upper incisors and moving it elastically along the hard and soft palate.

Giving the protruding tongue the shape of a tube, a shoulder blade and maximally turning it in different directions.

Strong resting of the tip of the tongue on the upper incisors with clenched jaws.

Rapid bending and stretching of the tongue, leaning on the hard palate, sticking it out.

Circular movements of the tongue on the lingual and facial surfaces of the teeth.

Slicking with the tongue, bending its tip up and back, that is, giving it the shape of a hook.

Pronunciation of the sounds "t-k", "rt-tr", "d-d-d".

Pressing the tip of the tongue on each cheek in turn.

Slow movement of the tip of the tongue along the outer surface of the upper row of teeth (count the teeth).

Sticking out the tongue with an attempt to reach the tip of the nose.

Swallowing saliva or small portions of water by raising the tip of the tongue and pressing it against the front part of the hard palate.

8.3. To strengthen the orbicularis oculi muscle (especially necessary for a distal bite, with a low attachment of the frenulum of the upper lip):

Pulling the corners of the mouth up and to the sides (actively and with the help of fingers).

Protrusion of the upper lip with an attempt to reach the nose during nasal inhalation.

Inflation of the space above the upper lip with protrusion (protrusion) of the lower incisors.

Tongue massage of the circular muscle of the mouth.

Slowly stretching the corners of the mouth with the fingers while the lips are compressed with a tube.

Pulling one button with the hand from the other, pressed with the lips (the buttons are connected between themselves with a cord).

Keeping the Friel disk between the lips for 15 minutes, the paper folded in half - for more 30-50 min.

8.4. To strengthen the lateral pterygoid muscle, which provides extension lower jaw forward and to the sides:

Slowly push the lower jaw forward, trying to cover it as much as possible with the upper incisors, hold in this position for 10-15 seconds, and then turn back starting position Repeat 10-20 times, alternating with exercises for the circular muscle mouth. Perform the same exercise with turning the head to the right and left, sitting and standing. After mastering the above-described exercises, keep the lower jaw extended forward position as long as possible.

8.5. To train the cheek muscles:

Retraction of the cheeks into the oral cavity.

Inflating the cheeks and moving the air left and right with the mouth closed.

Pulling the corner of the mouth to the left and right.

8.6. For the muscles that raise the lower jaw:

Opening and closing the mouth, clenching the teeth (control the force of muscle contraction fingers attached to the masticatory muscles).

The same exercise with resistance with the fingers on the lower frontal ones teeth.

Drying the stick and gradually moving it along the tooth row.

Chewing rubber objects, chewing gum.

Methods and criteria for assessing the adequacy of the use of physical exercises:

- anamnestic — no complaints, good mood
- stomatoscopic — an expression of satisfaction on the face, its moderate redness
- pulsometric - the value of the pulse does not exceed the initial one.

9. Methods and criteria for evaluating the effectiveness of complex treatment:

- Gnathometric — increase in chewing pressure on different teeth of the dentition.
- Masticatory - increase in amplitude and frequency of wave-like movements of the curve, steeper descending knee of the curve.
- Electromyographic — increase in duration and amplitude of biopotentials of restored muscles.
- Christiansen's test - increase in mass of sieved particles of chewed nuts.
- Rubinov's test - reduction of the time of swallowing after chewing 0.8 g of hazelnut.
- Functional - restoration of nasal breathing, speech, normalization of biting, chewing, swallowing.

Control questions:

1. Name functional disorders in congenital defects of the maxillofacial area
2. What are the features of hardening children in the preoperative period of treatment?
3. Peculiarities of using physical exercises in childhood
4. What physical exercises can be used before a 3-month-old child?
5. In what form is it advisable to conduct physical exercise classes with children of preschool and school age?
6. What special tasks need to be solved in the early postoperative period?
7. What special tasks must be solved in the late postoperative period?
8. What special tasks need to be solved in the distant postoperative period?
9. What depends on the movement mode and the method of conducting physical exercises in children after surgery?
10. How are exercises for facial muscles dosed?
11. Name the main exercises for the soft palate and their dosage
12. Describe a normal bite.
13. What is a malocclusion?
14. List the main abnormalities of the bite
15. Describe the sagittal bite anomaly
16. Describe transversal anomalies of bite

17. Describe the vertical abnormalities of the bite
18. List the main causes of malocclusion
19. List the main functional disorders in bite anomalies
20. What special problems must be solved by FR means in the case of bite anomalies?
21. List special exercises for distal bite
22. List special exercises for pathological progeny
23. List special exercises for a deep vertical bite
24. List special exercises for open bite
25. What methods and criteria are used to evaluate the adequacy of the use of physical exercises?

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