

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

Approved
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protocol №____ by _____
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METHODICAL RECOMMENDATION
for independent work of students during the preparation
to practical lessons and on the lessons

Academic discipline	Orthodontics
Module № 1	Orthodontia. Diagnostic of dentognathic anomalies and deformations.
The theme of the lesson №8	Methods of investigation of respiratory function. Functional respiratory test. The tests on the breath (Stange's and Gench's tests). Spirometry, vital capacity (VCL) in patients with malocclusion.
Course	III
Faculty	Preparation of foreign students

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1. The relevance of the topic. Normal breathing is one of the components myodynamic balance in the maxillofacial region that is key to the proper formation of the maxillofacial region. That is why the relevance of the topic due to the need to know methods of investigation of respiratory function.

2. Specific objectives:

To know the methods of functional diagnostics used in orthodontics.

To know methods of determining the respiratory function.

The indication for prescription of methods for determining the respiratory function.

To be able to determine the violation of respiratory function.

The analysis of data obtained when carrying out functional methods of research.

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

Name of previous disciplines	Skills
1. Anatomy	to know the structure of the facial and brain skull; to know the places of attachment of muscles of the maxillofacial area, and their functions.
2. Normal physiology	to know the laboratory methods of respiratory function; to know the normal values of physiological parameters during the examination of respiratory function using laboratory and clinical methods of examination; to be able to determine the timing of muscle contraction; to be able to analyze the data held on laboratory and clinical research.

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. Breath	A set of reactions of biological oxidation of organic substances with release of energy required to sustain the organism; it is the totality of processes that ensure the intake of oxygen used in oxidation processes and the removal of the body of carbon dioxide. Consists of three consecutive steps: external respiration, transport of gases by the blood, internal respiration.
2. Stange's test	Holding the breath on the inhale. The basic breath in breath

	refers to the delay in the "neutral" pressure in the lungs, that is, when the pressure inside the lungs and the pressure outside of the chest equally. In this state the chest is maximally relaxed. The delay of breath occurs with the volume of air approximately equal to 2/3 of the maximum possible breath.
3. Gench's test	Holding the breath on the exhale. After 2-3 deep breaths exhale deeply and hold your breath for as long as possible. Time there is a moment of breath-holding to its termination.
4. Spirometry	Is a method of research of function of external respiration, which involves measuring lung capacity and speed performance of the respiratory.

4.2. Theoretical questions to the lesson:

1. Respiration types, methods of detecting.
2. What signs are characteristic of oral breathing?
3. The functional respiratory test.
4. Stange's and Gench's tests, methods of conducting and estimating them.
5. Spirometry: the aim of investigation, technique.
6. Spirography: the aim of investigation, technique.
7. Rhinopneumometry: the aim of investigation, technique of conducting it.
8. What anomalies and deformations of the craniofacial area are caused by the violation of nasal breathing?

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

- to conduct the functional respiratory tests;
- to conduct and estimate results of stange's and gench's tests;
- to decode the results of spirometry, spirography, rhinopneumometry.

The content of the topic:

There are differentiated nasal, oral, and mixed types of breathing. At increased physical load physiological breathing through the mouth is possible. In other cases the presence of oral breathing indicates function violation. Oral breathing is characterised by not closed lips, negative pressure decrease in the oral cavity. Clinically it is evident by the lowering of the lower jaw, "double chin", which indicates glossoptosis, i.e. the lowering of the tongue. The "adenoid" expression of face testifies to the presence of oral or mixed breathing. It is characterised by the wide dorsum of nose, smoothed nasolabial folds, flabby wings of nose, apathic sight, and slightly lowered, forced position of the head. Clinical and roentgenologic investigations allow finding mechanical obstacles for nasal breathing: nasal septum deviation, hypertrophy of turbinates, laryngeal tonsil, palatine tonsil, etc. At the deformation of the upper jaw and Gothic palate the

volume of the nasal cavity may decrease, pneumatization of air-bearing cranium sinuses is violated. At that, air stream is weakly moistened and warmed, which leads to insufficient bacteriostatic and bactericidal action of the nasal mucosa. Such patients suffer from tracheitis and chronic bronchitis more often.

Violation of the respiratory function changes the muscle tone and keeps the lower jaw in the quiescence. The change of muscle balance in the craniofacial area reflects on the formation of the facial skeleton, development and tone of neck muscles. At dentognathic anomalies as a result of load redistribution carriage is not infrequently violated, spinal curvature arises, especially at the level of the 3rd–4th cervical vertebrae. Irregular position of the hyoid bone may change the position of the cranium relative to the spine, and sometimes the forms of the spinal column and chest. Violated carriage, in its turn, conditions the slowing-down of chest development and violation of lungs function.

The upper air passages, pneumatized cranial bones and lungs form a single whole from the functional point of view. The violation of this functional integrity is characterised as weakness of the lung system and is named sinus bronchial pneumopathy. For its recognition complex investigation is often needed, which is conducted by an orthodontist, an otolaryngologist, a pediatrician-orthopedist, and other doctors.

Dynamic methods of studying the respiratory function are aimed at detecting the organism's ability to hold breath and the vital capacity of lungs (VCL) at different physiological states.

At sagittal occlusion anomalies VCL decreases relative to the necessary vital capacity of lungs (NVCL) by 500 ml on average. In 50 % patients with full-blown sagittal occlusion anomalies VCL is decreased relative to NVCL by 200 ml and more, with posterior occlusion – by 600 ± 200 ml (21.3 ± 7 %) on average. In patients with mesial occlusion, conditioned by congenital unilateral through fissure of the upper lip and palate, VCL is less than NVCL by 430 ± 150 ml (19.65 %) (F.Y. Khoroshilkina, 1970).

The functional respiratory test includes the detection of oral breathing. With this purpose cotton fibers are brought to each nostril and their motion is observed. At heavy nasal breathing cotton excursion is minimal or absent. Besides, it is recommended to take water into the mouth and keep it there for the maximum period of time. At sharply heavy nasal breathing the patient is forced to swallow the water to breathe through the nose.

Breath-holding tests after maximal inspiration (Stange's test) or after maximal expiration (Gench's test). The patient is offered to take a deep breath or to breathe out fully and hold breath, having pressed the wings of nose and lips. The time of breath-holding is measured with a stopwatch. Because of stop of blood arterialization oxidation products, including carbonic acid, accumulate in the organism. The excitation of respiratory center increases, which leads to the decrease of the ability to hold breath. Normally without special training breath is held at inspiration for 30-60 seconds, at expiration – 20-30 seconds. In 63.6 % of patients with sagittal, occlusion anomalies the time of breath-holding is less than

the norm at inspiration: at posterior occlusion 23.18 ± 1.7 s, at mesial – 20.01 ± 1.1 s, at exhalation at posterior occlusion 14.3 ± 1.0 s, at mesial – 11.5 ± 0.7 s (F.Y. Khoroshilkina et al., 1970).

Spirometry allows studying the functional ability of the lung system. There have been offered different devices for spirometric and spirographic study of respiration. The technique of investigation depends on their variety.

The aim of investigation is detecting VCL: maximal, residual, in the state of physiological rest and dynamic load. Obtained results are compared with the data of average norm taking into account sex, age, height, somatic development of the examined patient and other factors.

Panoramic radiography of the chest at sinus bronchial pneumopathy allows finding changes in the lungs, which declare themselves mainly in diffuse amplification, enriched and localized exhaustion of the lung pattern. This is connected with peribronchial-perivascular infiltration and emphysema appearance. In children older than 12 years such changes are the most evident. In some cases they are estimated as the evidence of chronic pneumonia.

Respiratory embarrassment at oral breathing in patients with sagittal occlusion anomalies often leads to myocardium contraction enhancement and right heart cavities increase. Insufficient oxygen incoming into the organism and the disturbance of oxidation-reduction processes as a result of YCL decrease may cause the delay of somatic and mental development of the child.

Materials for self-control:

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

1. To draw the scheme of myodynamic balance by Winders.

B. Tasks for self-control:

1. Patient A. 8 years old assigned clinical functional test with the wool fibers. What purpose carries out the study?

to determine the respiration type

to determine the swallowing type

to determine speech disorders

to determine occlusion

to determine the chewing disorder

2. The laboratory studies of the patient P., 10 years by rhinopneumometr was conducted. Which function state of the oral cavity can to determine by this device?

breathing

swallowing

speech

functions of the lips closing

chewing

3. Normally, the time of Gench's test is determined as:

15-30 sec.

20-30 sec.

10-20 sec.

25-40 sec.

20-40 sec.

4. When conducting clinical functional Stange's test in a patient 7 years have determined the duration of breath-holding for 15 seconds. Which is the normal time of conducting this study?

30-60 sec.

20-40 sec.

20-30 sec.

15-30 sec.

10-20 sec.

5. To determine the respiration function state is used research method:
clinical test with the wool fibers

gnatodinamomretry

electromyography

palatography

lingvodinamomretry

6. The advantage of nasal breathing is the following:

the air is humidified

the air is saturated with oxygen

the air is saturated with micro-organisms

the air is saturated with carbon dioxide

the air is saturated with microelements

7. Long-term obstruction of the nasal passages occurs a bad habit:

mouth breathing

thumb sucking

sucking tongue

the upper lip sucking

the lower lip sucking

8. The mouth breathing leads to tone disorders of the:

m. orbicularis oris

m. zygomaticus

m. risorius

m. caninus

m. mentalis

9. The pathogenesis of dental arch and the hard palate deformity at the mouth breathing is caused by:

- lack of tongue pressure on the upper jaw
- change the tone of the neck muscles
- lack of correct pose body in the space
- lack of occlusal contact of teeth upper and lower jaw
- change the gravity center of the lower jaw

10. Facial signs of the mouth breathing is:

- convex face type
- mesocephalic face type
- brachicephalic face type
- concave face type
- straight face type

11. The frontal part of the upper dentition length Increasing at the mouthf breathing is caused by:

- lack of circumoral muscle pressure
- lack of tongue pressure
- absence of occlusal contacts
- absence of air pressure in maxilla sinus.
- absence of the pressure from buccal muscles

12. Narrowing of the upper dental arch in the area of premolars and molars at the mouth breathing is caused by:

- the pressure of the buccal muscles
- the lack of pressure of the circumoral muscle
- hyper pressure of the circumoral muscle
- absence of occlusal contacts
- absence of the pressure of the buccal muscles

13. "Glossoptosis", which occurs when the mouth breathing indicates:

- tongue position on the floor of the mouth
- hyper pressure of the chin muscles
- distal location of the lower jaw
- gothic palate
- hyper pressure of the circumoral muscle

14. To determine the function of nasal breathing used laboratory method of diagnosis:

- spirometry
- X-Ray

linguodinamometry
palatography
electromyography

15. Insufficient intake of oxygen at the mouth breathing may cause:
the delay of somatic development
accelerated teething
the appearance of sucking habits
the change in the resistance of periodontal tissues
tongue disorders

16. Spirometry allows us to study:
lung capacity
the breath on the inhale
the breath on the exhale
total respiratory failure
the presence of nasal breathing

17. Lung capacity, as a factor in nasal breathing depends on:
the type of somatic growth of the patient
the kinds of food
the place of residence of the patient
the day time
the width of the face

18. The maxillary sinus pneumatic disorders the due to mouth breathing leads to:
narrowing of the upper jaw
excessive growth of the lower jaw width
excessive growth of the upper jaw width
the palate flattening
the shortening of the upper jaw frontal segment.

19. The closing lips disorders occur at the following incorrect function:
breathing
thinking
chewing
speaking
sucking

20. To determine the degree of closing lips dysfunction the following research method shown:
electromyography
X-ray
linguodinamometry

palatography
myography

21. When disturbed nasal breathing is formed:

“adenoid” type of face

broad face

average face

short face

“bird face”

22. In norm must be:

nasal type of breathing

mouth breathing

abdominal type of breathing

spirometric type

rhinopneumonic type

23. When the mouth breathing is formed:

gothic palate

flat palate

arch palate

trapezoid palate

extended palate

24. For the nasal type of breathing is characterized by:

quiet closing of the lips

fixed wings of the nose

dry red border of the lips

the face wrinkles

symptom of the “lemon crust”

25. On clinical examination 8 years old patient revealed a wide back of nose. The reason for its expansion can be:

nasal breathing disorders

allergy

unilateral chewing

infantile swallowing

nasal breathing

26. During examination of the patient revealed bilateral narrowing of the dental arches. These changes of the dentition can result from dysfunction of the:

breathing

thinking

swallowing

chewing
language

27. Newborn nasal passages are:

narrow
broad
average
curved
colateral

28. At the mouth breathing the next muscles disorders can be:

circumoral muscles
proud muscle
cheekbone muscle
temporalis muscle
masticatory muscle

29. At the nasal breathing the tongue position is follows:

adjacent to the palate
adjacent to the lower teeth
located on the oral cavity floor
located between the teeth
rests in the lower jaw

30. Prolonged mouth breathing occurs the next face changes:

lower third of the face decreasing
lower third of the face increasing
reducing of the middle face third
reducing of the upper face third
face asymmetry

31. When the mouth breathing the patient must be examined by a doctor:

ENT
ophthalmologist
pediatrician
speech pathologist
the psychiatrist

32. At the mouth breathing the lower jaw is usually in:

distal position
neutral position
mesial position
shifted to the right

shifted to the left

33. The displacement of the mandible distally at the mouth breathing occurs as a result of next muscles hyper tone:

those who lowered mandible

those displacing the lower jaw to backward

those displacing the lower jaw in front

those displacing the lower jaw to the left

mimic muscles

34. Patency of the nasal passages is determined by:

rhinopneumometer

gnatodinamometer

myoathanometer

tonometer

thermometer

Literature

Main:

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