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Use of Froggymouth Myofunctional Devices in the Complex Treatment of Sleep Apnea Patients

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The purpose of the study. Increasing the effectiveness of complex treatment of patients with sleep apnea.

Research methods. Clinical examination methods were carried out on 15 people in the comparison group. These are patients without nocturnal apnea, cardiovascular or endocrine pathology, dental and jaw anomalies, oral habits, and normal swallowing. 34 persons aged 15–17 with obstructive sleep apnea were examined and treated.

A clinical examination was conducted, with an external oral examination, determination of swallowing and breathing patterns, and the state of the temporomandibular joints being important. Patients were given a secret questionnaire to identify stressful factors that affect the body. The results of the cephalometric study were evaluated and compared with those of the clinical examination.

Scientific novelty. The results of a clinical and cephalometric study confirm the change in the tongue's position in patients of the 1st group during complex therapy. It is necessary to ensure the patency of the upper respiratory tract during sleep in OSA patients. Myofunctional devices such as Froggymouth (France) were used in the complex treatment.

Conclusions. Our study indicated that patients with sleep apnea aged 15–17 years were diagnosed with problems from the side of the maxillofacial apparatus, characterized by narrowing the maxilla in the transverse and sagittal planes. The treatment plan should be etiopathogenetic. Myofunctional devices, aimed at forming new swallowing skills and cooperation between doctor and patient, considering all stages of labiotherapy, should be included in complex treatment.

A clinical and laboratory study shows the effectiveness of Froggymouth devices in treating sleep apnea.

Keywords: sleep apnea, cephalometry, myofunctional devices, labiotherapy, stress, criminal offense.

Statement of the problem

Scientific studies indicate that stress triggers the development of some diseases [7, 14]. Unfortunately, recently, the lives of children in Ukraine have turned into continuous chronic social stress due to war in our country, constant air alarms, and the fear of being left without a home or relatives and losing their lives. Stressful factors must somehow be leveled off. This mechanism is often ensured by the development of oral habits [6, 11, 17, 20]. Like other authors, we observe mouth breathing, provided the airways are open. In such cases, it is an oral habit that has many dangers. In particular, it is a trigger for changing the tongue's position. And in the future, obstructive sleep apnea (OSA) will develop in this patient. Oral habits are believed to be an element of adaptation to existing chronic stress [10, 14]. Several studies indicate the negative impact of mouth breathing on the formation of the facial skeleton and bite formation in children [3, 9]. Scientists emphasize that the oral habit of mouth breathing affects not only the growth of the face, but is the main reason for forming an open bite and clockwise rotation of the mandibula [2, 8]. Morais-Almeida M, Wandalsen G, Sol D. emphasize that mouth breathing should be considered as a potential cause of facial growth retardation in children [15]. Ramirez-Yanez German O. demonstrates the relationship between mouth breathing and high blood pressure, sleep apnea, and the development of many cardiovascular diseases [18]. However, parents and children often neglect the impact of oral habits on the development of dental abnormalities, acquired facial deformities, and cardiovascular diseases. Mouth breathing is often combined with another important

problem of modern children, such as the lack of a formed normal act of swallowing, where the tongue muscles work actively.

In the absence of stressors, swallowing automatically changes at 4–5 years old. However, children live in stressful conditions, and often, they do not allow children to switch the action of the facial nerve to the action of the trigeminal nerve. Kandel ER believes that everything we have in habits and skills results from the nervous system activity [12].

Today, sleep apnea is one of the important problems of modern medicine. It is associated with the prevalence of pathology among people of different ages. Sleep apnea can happen to anyone, ranging from infants and children to older adults. Sleep apnea is uncommon but widespread. Sleep apnea is a long-term, chronic condition. For some people, it's possible to resolve it by reducing their weight or undergoing certain treatments. For others, it may be a lifelong condition.

Sleep apnea is a disorder that causes one to stop breathing while asleep. The word "apnea" comes from the Greek word for "breathless." Usually, the patient's brain tries to protect him by waking the patient up enough to breathe, but this prevents restful, healthy sleep. Sleep apnea can lead to serious or even deadly complications, so early diagnosis and treatment are important. Apnea is divided into obstructive (OSA) and central (CSA). Scientists emphasize that obstructive sleep apnea occurs when the tongue and soft palate block the airway while a person is sleeping [18]. Obstructive sleep apnea has some risk factors. Among them are the ages of the people before age 50. Apnea is more common in people assigned male at birth (AMAB). After age 50, it affects people assigned female at birth (AFAB) at the same rate. Having excess weight or obesity usually increases the risk of developing apnea.

Central apnea (CSA) occurs because the patient's brain doesn't correctly control his breathing. Central sleep apnea is most common in people who take opioid pain medications. It occurs in adults over 60 years old, people with heart conditions such as atrial fibrillation or congestive heart failure are also in a risk group, patients with hypoxia, nervous system damage, especially in the brainstem (which is what manages your breathing) or parts of the spinal cord, patients with nervous system conditions like amyotrophic lateral sclerosis (ALS, also known as Lou Gehrig's disease).

To understand how sleep apnea works, it is important to understand the human sleep cycle. It is a well-known fact that sleep happens in multiple stages. Stage 1 is a light sleep. This is a short stage that begins right after you fall asleep. It accounts for about 5.0% of your total sleep time. Stage 2 is a deeper sleep. This stage is deeper and makes up about 45.0% to 50.0% of all the time you spend sleeping (this number goes up as you get older). Stage 3 is a slow-wave sleep. This is the deepest sleep stage, making up about 25.0% of the time patients spend sleeping (this number goes down with age). It's very challenging to wake someone up in stage 3 sleep, and waking up directly from it usually causes a state of "mental fog" and slowed thinking. Sleepwalking and sleeptalking happen in this stage 3. REM sleep is a sleep that stands for "rapid eye movement." This stage is when you dream. When a person is in REM sleep, you can see their eyes moving beneath their eyelids.

When you fall asleep, you typically enter Stage 1, and then move into and cycle between Stages 2 and 3. After cycling between those stages, you'll ultimately go into REM sleep and start dreaming. After the first REM cycle, you start a new cycle and go back into Stage 1 or 2. One cycle normally takes about 90 to 110 minutes before another begins. Most people go through four or five cycles per night (assuming they get a full eight hours of sleep).

Obstructive events (OSA), which are very short-lived, can affect any stage of sleep. They're most common in Stage 1, Stage 2, and REM sleep. That's why it's common for people to not remember apnea events, which means they may not know they have a problem until the symptoms are noticeable. We have mentioned that central events are most common in Stages 1 and 2 of sleep. In any case, can occur during any stage.

Scientists say that the brain constantly monitors the body's status and adjusts heart rate, blood pressure, breathing, etc. Blood oxygen levels can drop when you stop breathing because of either apnea or hypopnea. Scientists mention that the brain reacts to blood oxygen drops (apnea, hypopnea) by triggering a failsafe-like reflex, waking you up enough for you to breathe again. Once you resume breathing, your brain automatically tries to resume your sleep cycle. They said that the apnea/hypopnea index (AHI) is the average hourly number of apnea or hypopnea events (times of breathing stops). The AHI is the main factor determining the severity of sleep apnea. We divided apnea into three types. Mild sleep apnea is a type of apnea when a person has an AHI between 5 and 15 events per hour. Moderate sleep apnea is a type of apnea when a person has 15 and 29 events per hour. Severe sleep apnea is a type of apnea when a person has up to 30 events or more times in an hour. That means they stop breathing and/or wake up 240 times or more during a full eight hours of sleep.

Apnea is a very dangerous pathological condition that leads to a decrease in air intake, which disrupts

sleep, develops cardiovascular diseases, and disrupts hematopoiesis. Patients with apnea have constant fatigue, nocturnal hypertension, narcolepsy, myocardial hypertrophy, nocturia, or enuresis. These processes lead to decreased mental activity, constant irritability, microsleep, and cardiovascular diseases (hypertensive disease, stroke, myocardial infarction).

Today, various approaches exist for treating sleep apnea, depending on the specific type (OSA, CSA) and its severity (mild, moderate, severe). While none of these methods offer a cure, they can help prevent apnea events or lessen their frequency and severity.

A combination of treatments should be a part of your daily (or nightly) routine. That can ultimately reduce or even eliminate sleep apnea's effects on your life for as long as you use these treatments. Treatment is divided into conservative and surgical. In conservative treatment, we have weight loss, adaptive ventilation devices, oral appliances (mouthpieces, myofunctional devices), nerve stimulators, and medications (CSA only). They can typically improve obstructive sleep apnea or resolve it. In surgical methods, we have somnoplasty (that is used to reduce soft tissue around the upper parts of your windpipe), tonsillectomy/adenoidectomy, uvulopalatopharyngoplasty (UPPP), jaw surgery, and SARPE. It is important to remember that if the cause of apnea was identified, this condition could be cured. And it is not only possible to reduce the number of attacks and alleviate clinical symptoms.

We should treat apnea only after determining the cause. Often the etiological factor is dental pathology. Such patients are referred to an orthodontist and a gnathologist. Among the etiological factors are the underdevelopment of the upper jaw and as a result (class III), narrowing of the lower nasal passages, development of class II occlusion, reduction of the bite height, and as a result, distalization of the lower jaw and reduction of space in the oral cavity for the tongue, abnormal position of the tongue during atypical swallowing. In patients with atypical swallowing, a tongue, while relaxing, keeps pressing backward on the windpipe while the patient sleeps, which is one of the ways that obstructive sleep apnea happens. Obstructive sleep apnea happens when soft tissue, especially around the oral cavity and jaw, presses downward on your windpipe. Special myofunctional devices like Froggymouth can help to "teach" the tongue to hold in a position that keeps pressure off your windpipe. This device helps prevention of pushing the patient's tongue slightly forward when he breathes while sleeping. Fellus Patrick and Lecendreux Michel studied the effect of active labial therapy in children with neurological disorders, who usually have articulation, tongue position, and swallowing disorders [4]. Therefore, it is worth studying the need for myofunctional therapy in patients with OSA, who have similar symptoms to patients with neurological disorders.

The purpose of the study

Increasing the effectiveness of complex treatment of patients with OSA.

Research methods

Clinical examination methods were carried out on 15 people in the comparison group aged 15–17. These are patients without apnea, cardiovascular, or endocrine pathology, dental and jaw anomalies, oral habits, and normal swallowing. 34 persons aged 15–17 with sleep apnea were examined and treated.

A clinical examination was conducted, where an external oral examination, determination of the way of swallowing and breathing, and determination of the state of the temporomandibular joints were an important point. All patients were assessed for anxiety and STAI tests [13]. Patients were given a secret questionnaire to identify stressful factors that affect the body. Diagnosing sleep apnea usually involves asking questions about symptoms and history. If we suspect sleep apnea based on a patient's symptoms and answers, we'll likely want our patients to undergo testing for sleep apnea.

The results of the cephalometric study were evaluated and compared with the results of the clinical examination.

All patients underwent determination of mouth breathing, functional respiratory test, nasal breathing, and airway patency were studied, and the condition of the palatine tonsils, tongue position, and swallowing type were determined. There are patients with existing nasal breathing, but they have developed an oral habit—mouth breathing or hidden mouth breathing. They are the risk group for developing sleep apnea in the future. Often, such patients are unable to independently overcome mouth breathing, so it is necessary to help the patient's brain develop an alternative type of breathing. The orthodontist comes to the rescue with myofunctional devices Froggymouth (France).

All patients were treated with fixing appliances such as Hyrex and MARPE with support on TAGs and bracket systems. Patients in Group 1 (16 people) received classical treatment for upper micrognathia. Patients in Group 2 (18 people) received treatment supplemented with a myofunctional device Froggymouth (France).

Before treatment and at the stages of complex treatment, all patients underwent radiological examination methods to confirm the diagnosis and deter-

Fig. 1. Fixing the Froggymouth device to the patient's lips

mine the position of the tongue, branches of the lower jaw, and transverse dimensions of the upper jaw[19].

The doctor selects the patient's device according to the lips' linear size. 3 sizes of Froggymouth have been developed (S, M, L). Choosing a size smaller than the linear size of the lips at rest is recommended. The device prevents the action of the facial nerve and, in turn, the contraction of the *m. labio-mentum*, *m. jugal* during swallowing. Clamping the facial nerve allows its antagonist—the trigeminal nerve—to work, which controls the respiratory centers in the pons segment through its sensory nucleus. Thus, nasal breathing is restored [5]. Labial therapy consists of work at home and in the clinic. At home, the patient fixes the device on the lips in a sitting position for 15 minutes 2 times a day, 1–1.5 months (Fig. 1).

In the clinic, the patient goes through three stages with the doctor. In the first stage, the orthodontist must help create a motor image of the height of the *m. stiloglossus*, the muscle that raises the lingual dome, and ensure the formation of a vacuum in the oral cavity during swallowing. The procedure is as follows: the doctor takes a mirror and lightly presses on the V-section of the tongue and forces the patient's tongue to fight against the mirror (Fig. 2*a*). Repeat 3–4 times. Remember that this exercise is for clinical use only.

An alternative version of this exercise can often replace it. It consists of pressing the index finger on the floor of the mouth and simultaneously asking the patient to swallow saliva. It is designed to "engage" the tongue in the swallowing act in rise to the palate and ensure the formation of a vacuum in the oral cavity (Fig. 2*b*). When the patient is at "stage 1," we move on to olfactory exercises, or in other words, perfume exercises. They are designed to help the patient move to the next stage and achieve the correct swallowing and nasal breathing pattern. The doctor should not be satisfied with just the neuromuscular response. To accomplish this, we need three bottles of perfume. We prefer essential oils. The labels on the bottles must be removed or glued. All bottles must be the same in color, shape, and size. The patient is given one smell to smell. The doctor moves the bottles, and the patient tries to find the aroma. The exercise can be made more difficult by adding aromas. The exercises can be repeated outside the clinic to improve the previously programmed positioning with Froggymouth for faster results.

To understand whether we have achieved the desired result, we proceed to the third stage of exercises, which aims to inhibit old dysfunctional schemes. This is important for achieving the durability of the result and understanding whether labial therapy has given the desired result. The patient is asked to count with his lips with clenched teeth from 1 to 20. Then, repeat the same count from 1 to 20, clicking his teeth between each number. The doctor needs to pay attention to the position of the patient's tongue: does he not strive to pass the dental barrier, does he perform the swallowing function and remains in place. Only when the patient articulates with his lips and swallows saliva, raising his tongue to the palate, can labial

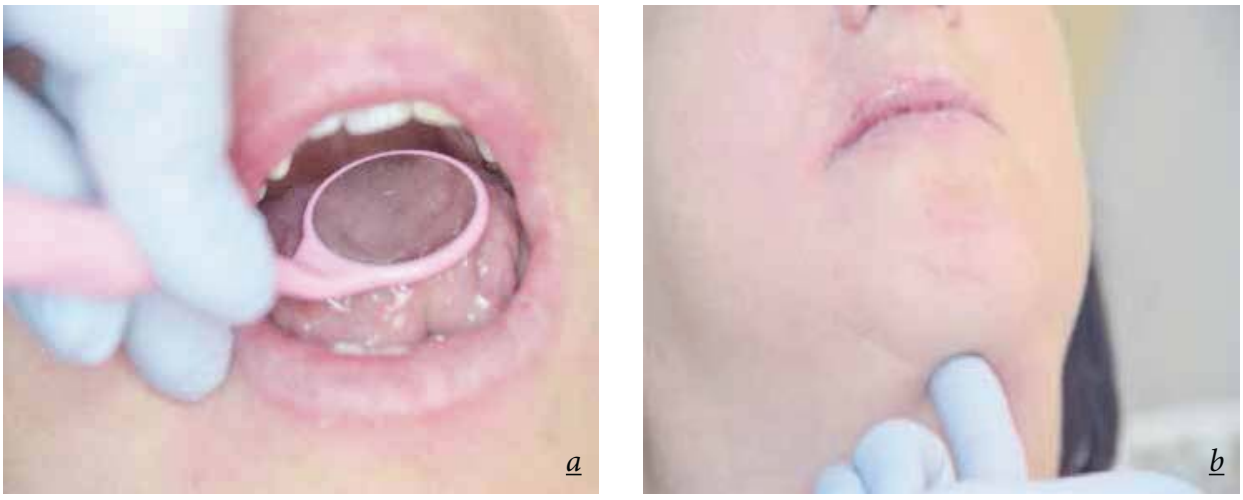

Fig. 2 (*a, b*). Exercise for normalizing the position of the tongue

therapy be completed. Fellus Patrik believes this is the final stage of treatment, after which the patient can reduce active Froggymouth treatment to 1–2 times a week for 15 minutes.

Research results and their discussion

The results of the study indicated that all children, according to the results of STAI tests, have an anxiety state of more than 45 points, which indicates a high level of anxiety. The results of the questionnaire indicated that 15 children (93.7%) of Group 1 and 17 children (94.4%) of Group 2 live in a state of chronic tension. All patients had a primary diagnosis of sleep apnea stage middle. Patients indicated symptoms: snoring, waking up repeatedly in the middle of the night, needing to go to the bathroom (nocturia) or bedwetting (enuresis), frequent arm or leg movements while asleep, sleeping in unusual positions or sleeping with their neck extended, reflux (heartburn) or night sweats, feeling tired or even exhausted when waking up, commonly feeling of exhausted, daytime sleepiness this can cause (studying or other activities), mood changes (depression and anxiety), headaches, especially when waking up, disruptions in brain function (memory loss, trouble concentrating or other brain-related issues), hyperactivity or trouble focusing or performing poorly in school. This can look like symptoms of attention-deficit/hyperactivity disorder (ADHD).

A mandatory stage of complex treatment was the conscious elimination of the bad habit and activating massage of the facial muscles. In the presence of upper micrognathia or crossbite, non-removable palatal structures (Hyrex, MARPE) were used, which are TAGs with the subsequent use of a bracket system. The length of the TAG and the area of its fixation were determined after scanning the upper jaw and processing the scan together with the results of computed tomography of the upper jaw and paranasal sinuses in the OnyxCeph3 computer program (Fig. 3). A mandatory stage of complex treatment was the conscious elimination of the bad habit and activating massage of the facial muscles. In the presence of upper micrognathia or crossbite, non-removable palatal structures (Hyrex, MARPE) were used, which are TAGs with the subsequent use of a bracket system. The length of the TAG and the area of its fixation were determined after scanning the upper jaw and processing the scan with the results of computed tomography of the upper jaw and paranasal sinuses in the OnyxCeph3 computer program (Fig. 3).

Hardware maxilla expansion with additional support on TAGs the jaw provides bony expansion, not dentoalveolar tilt (Fig. 4). This is especially important for patients with OSA and increased lower airway volume. The active phase of treatment was continued with braces (Fig. 5).

Cephalometric indicators diagnosed an increase in the upper jaw size in the transverse plane. This increase is caused by bone expansion, not the dentoalveolar inclination of the teeth (Fig. 6, 7).

For patients in Group 2, the main treatment was supplemented with myofunctional therapy to normalize the tongue's position and the type of swallowing and eliminate hidden mouth breathing. The majority of patients in this group (13 people (72.2%)) after 10 weeks moved to "stage 1," while patients in group 1 remained at "stage 0." 6 months after the start of complex treatment, patients in group 2 (16 people (88.9%)) moved to "stage 2," two people (11.1%) moved to "stage 1" after 10 weeks. Patients in group 1 remained at "stage 0." Patients in group 2 indicated normalization of sleep, snoring reduction, nocturia, and enuresis. These positive changes indicated an improvement in the quality of life of our patients and an increase in success and improved mood.

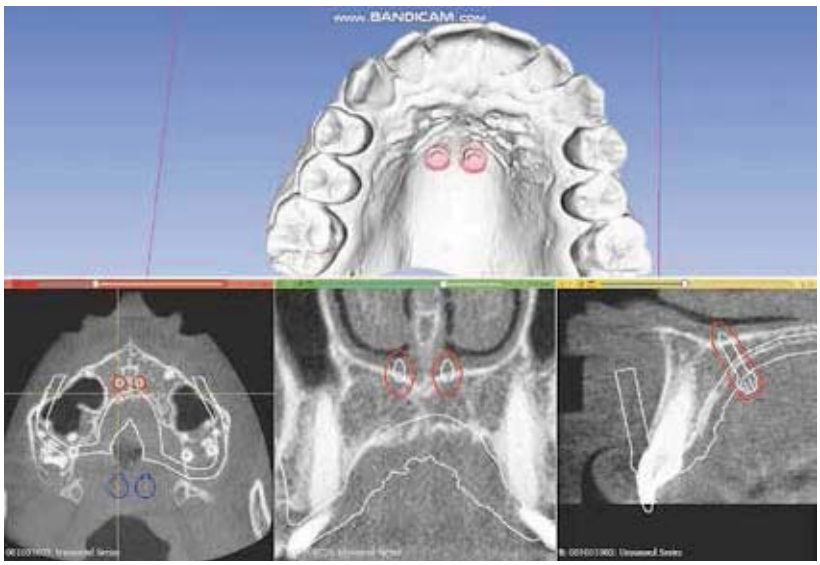

Fig. 3. Visualization of TAGs fixation areas

We believe that most oral habits, or the child's inability to develop a permanent adaptive type of swallowing, such as the position of the tongue at the bottom of the mouth, are associated with the state of the nervous system and stress factors surrounding the patient.

Scientists have gained significant insight into the molecular biology of long-term memory storage at the synaptic level over the past half-century. In recent years, we have gained

Fig. 4. Patient V., 15 years old. Diagnosis: upper micrognathia, oral habit (atypical swallowing), OSA. *a* — before treatment; *b* — 10 days after HYREX fixation.

insight into how long-term memory tracing is maintained and the cellular mechanisms of synaptic consolidation [1]. Okuno H. (2019) explains the mechanisms of learning and memory. Because most of our knowledge and skills are not innate but acquired, we can influence the development of new skills. [18]. The use of labial therapy helps the doctor to actively influence the primary type of swallowing, tongue position, and mouth breathing in patients with airway patency. For orthodontists, normalization of tongue position is significant. Myofunctional therapy with Froggymouth is especially important in patients with OSA, where the main factor is dental pathology, not changes in other organs and systems.

Fig. 5. Patient V., 15 years old. Diagnosis: upper micrognathia, oral habit (atypical swallowing), OSA. 3 month after braces fixation.

The results of our study show the effectiveness of the labial therapy technique developed by Fellus Patrick [5], as (88.9%) moved to "stage 2" and developed an adaptive type of breathing and normalized swallowing. The results of a clinical and cephalometric study confirm the change in the tongue's position in patients during complex therapy, which is necessary to ensure the patency of the upper respiratory tract during sleep.

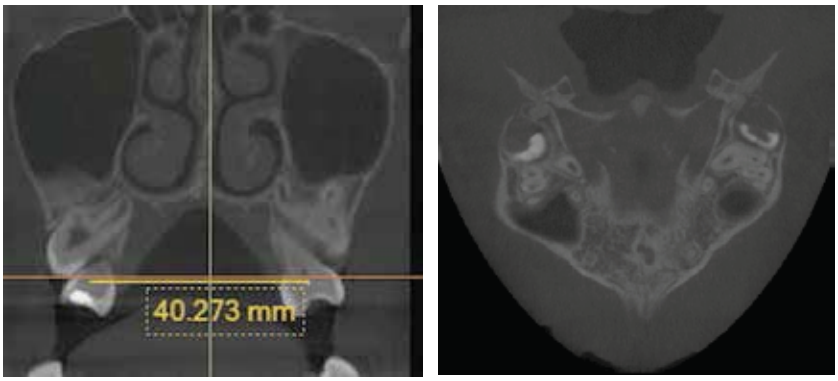

Fig. 6. Patient V., 15 years old. Diagnosis: upper micrognathia, oral habit (atypical swallowing), OSA. Cephalometric indicators before maxillary expansion *a* — transverse indicators, *b* — state of the palatal suture.

As a result of cephalometric research, the presence of compensatory mechanisms of the dentofacial system on the side opposite to the action of the traumatic factor, particularly the tongue, was revealed. The research results for most characteristics indicated positive dynamics toward normalizing the research indicators ($p>0.05$). The clinical and laboratory study results show the effectiveness of using Froggymouth devices in the complex treatment of sleep apnea. In patients with upper microg-

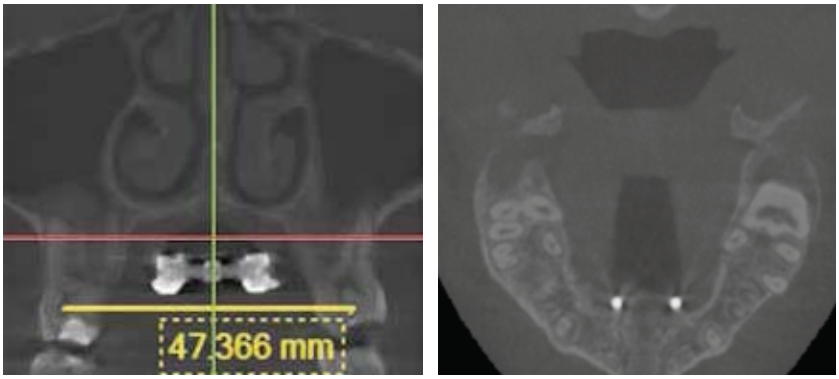

Fig.7. Patient V., 15 years old. Diagnosis: upper micrognathia, oral habit (atypical swallowing), OSA. Cephalometric indicators 3 month after maxillary expansion a) transverse indicators, b) state of the palatal suture.

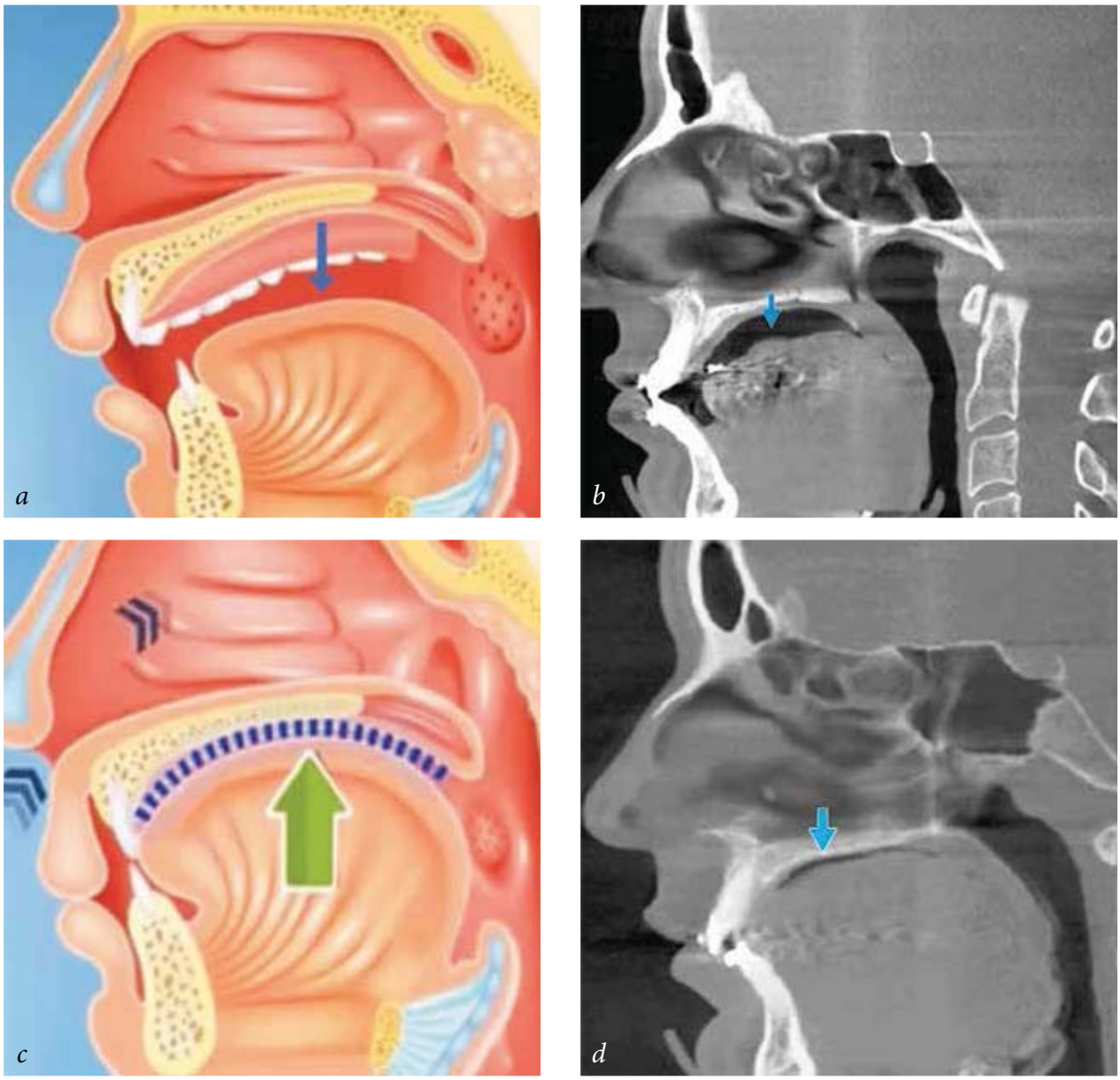

Fig. 8. Patient V., 15 years old. A tongue in the beginning of treatment (*a, b*) and 6 months after complex treatment with the Froggymouth device (*c, d*)

nathia, an increase in the transverse parameters of the upper jaw at the level of the molars and an increase in the F angle during SARPE and normalization of the tongue position were achieved. We believe that 3D cephalometric examination should be included in the basic diagnostic methods of sleep apnea associated with pathology in the maxillofacial region to determine the position of the tongue, the patient's bite height, and the transverse dimensions of the upper jaw. We must remember that OSA has a set of important consequences for children: growth and weight loss, changes in facial configuration, and permanent learning problems. In adults, apnea leads to impaired quality of life, danger while driving, obesity, and cardiovascular disease.

Considering the criminal law aspect in treating sleep apnea patients is also necessary. Making an incorrect diagnosis, appointment of incorrect treatment, carrying out medical procedures in violation of established rules, use of substandard or expired medicines, and improper maintenance of medical records can lead to serious consequences for the health and life of the patient. In this case, it is necessary to conduct a forensic medical examination to establish the presence or absence of the doctor's actions regarding the composition of the criminal offense under Art. 140 of the Criminal Code of Ukraine, "Improper performance of professional duty by a medical or pharmaceutical worker."

Conclusions

1. Sleep apnea is a widespread condition that disrupts a person's sleeping breathing. That causes a person to wake up just enough to breathe, interrupting their sleep and keeping them from feeling rested. Over time, sleep apnea can lead to serious complications in

children. The goal of treatment is to correctly diagnose and eliminate the etiological factor. Only then will the patient improve their quality of life and ensure the normal functioning of all organs and systems.

2. Our study indicated that often, the type of bite, the condition of the muscular system, and the position of the tongue are the cause of the development of OSA in children. Stress factors in which the patient lives stimulate the progression of harmful oral habits and are often a trigger in the development of pathological bite, abnormal tongue position in the oral cavity, and, in turn, the development of OSA.

3. The treatment plan should be etiopathogenetic because without eliminating the etiological factor, the patient will not receive the desired therapeutic effect and will have a relapse of the pathology. In the case of night apnea, impaired swallowing, abnormal tongue position, and hidden oral breathing, myofunctional therapy should be included in the complex treatment. Labial therapy with Froggymouth aims to form new swallowing skills and the tongue's position in the oral cavity at rest. The clinical and laboratory study results show the effectiveness of using Froggymouth devices in the complex treatment of patients with dentofacial anomalies on the background of night apnea.

4. The clinical and laboratory study results show the effectiveness of using Froggymouth devices in the complex treatment of sleep apnea. The study results for most characteristics indicated positive dynamics toward normalizing the research indicators in the 2nd group of patients ($p > 0.05$).

5. A 3D cephalometric examination confirmed the results of the clinical examination. They indicated the relationship of facial skeletal anomalies to children's development of the upper respiratory tract and apnea. As a result of the cephalometric study, the presence of compensatory mechanisms of the dentofacial system on the side opposite to the action of the traumatic factor, particularly the tongue, was revealed.

6. We believe that 3D cephalometric examination should be included in the basic diagnostic methods for sleep apnea associated with pathology in the maxillofacial region. This examination would determine the position of the tongue, the patient's bite height, and the transverse dimensions of the upper jaw.

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Використання міофункціонального апарату *Froggymouth* у комплексному лікуванні пацієнтів з нічним апное

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Мета дослідження. Підвищення ефективності комплексного лікування пацієнтів з нічним апное.

Методи дослідження. Проведені клінічні методи обстеження 15 осіб групи порівняння без нічного апное, серцево-судинної, ендокринної патології, без зубощелепних аномалій, шкідливих звичок та нормальним способом ковтання та 34 осіб із нічним апное віком 15–17 років.

Проводили клінічне обстеження, де важливим моментом було зовнішньоротове обстеження, визначення способу ковтання та дихання, визначення стану скронево-нижньощелепних суглобів. Хворим проводили таємне анкетування з метою виявлення стресових чинників, які впливають на організм, та анкетування, щодо виявлення симпномів нічного апное. Оцінювали результати цефалометричного дослідження та порівнювали їх з результатами клінічного обстеження.

Наукова новизна. Результати клінічного та цефалометричного дослідження підтверджують зміну положення язика у пацієнтів I групи у процесі комплексної терапії, що необхідно для забезпечення прохідності верхніх дихальних шляхів під час сну у пацієнтів з нічним апное, яким лікування було доповнено апаратом Froggymouth (Франція).

Висновки. Наше дослідження показало, що у пацієнтів з нічним апное віком 15-17 років діагностовано зміни зі сторони зубо-щелепного апарату, що характеризувалося звуженням верхньої щелепи у сагітальній та трансверзальній площині. Вважаємо, що план лікування повинен бути етіопатогенетичним. Міофункціональні апарати, направлені на формування нових навичок ковтання, положення язика, та співпраця між лікарем та пацієнтом з урахуванням усіх етапів лабіотерапії повинні включатися до комплексного лікування для усунення змін положення язика у пацієнтів з нічним апное.

Ключові слова: нічне апное, цефалометрія, міофункціональні апарати, лабіотерапія, стрес, кримінальне правопорушення.

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