Differentiated Speech Therapy Massage in a Complex System of Overcoming Dysphagia

Masaje diferenciado de terapia del habla en un complejo sistema de superación de la disfagia

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Abstract

The use of logopedic massage and gymnastics is necessary to normalize the tone of the muscles involved in swallowing, to improve their coordination, to form and restore kinesthetic feedback and restore cortical afferent and efferent links of arbitrary regulation of the swallowing act and chewing. Depending on the leading neurological syndrome, or a combination of disorders, which are identified by a specialist in the diagnosis process, a differentiated logopedic massage and special exercises are used to improve the mobility of the lips, tongue, soft palate, pharynx, larynx and vocal cords, facial and chewing muscles, muscles of neck and shoulder girdle.

Keywords: neurorehabilitation, patients with minimal manifestations of consciousness, rehabilitation potential, neurogenic (motor) dysphagia, differentiated speech therapy massage of neck and shoulder girdle.

Resumen

El uso del masaje logopédico y la gimnasia es necesario para normalizar el tono de los músculos involucrados en la deglución, para mejorar su coordinación, para formar y restaurar la retroalimentación cinestésica y restaurar los enlaces corticales aferentes y eferentes de la regulación arbitraria del acto de la deglución y la masticación. Dependiendo del síndrome neurológico principal, o una combinación de trastornos, identificados por un especialista en el proceso de diagnóstico, se utilizan un masaje logopédico diferenciado y ejercicios especiales para mejorar la movilidad de los labios, la lengua, el paladar blando, la faringe, la laringe y Cuerdas vocales, músculos faciales y masticadores, músculos del cuello y hombros.

Palabras clave: neurorrehabilitación, pacientes con manifestaciones mínimas de conciencia, potencial de rehabilitación, disfagia neurogénica (motora), terapia diferenciada del habla, masaje de cuello y hombro.

Introduction

Dysfunction or "dysphagia" is a term that denotes any difficulty or discomfort in promoting food from the mouth to the stomach and is the common name for disorders of the swallowing act (Gusev, Burd, & Nikiforov, 1999; Goyal, 1993). Manifestations of dysphagia are aspiration and dysphonia (Özel, B. A., Aksel, G., Kılıçlı, E., Muratoğlu, M., Kavalcı, C., Gülalp, B., & Kayipmaz, A. E. (2017).

Dysphagia associated with cricopharyngeal dysfunction (CPD) is of particular interest to the otolaryngologist because it may respond to cricopharyngeal myotomy. There is a wide variation in the reported incidence of cricopharyngeal dysfunction in patients with dysphagia (Baredes, Shah, & Kaufman, 1997; Brazis, Masdeu, & Biller, 2009).

Dysphagia is a common and serious problem after strokes involving both cerebral hemispheres and the brainstem. Clearly, swallowing problems could have serious consequences, with dehydration leading to haemoconcentration, impaired cerebral perfusion and renal failure, and aspiration leading to pneumonia (Ozpinar H, Ozpinar N, Karakus S. 2017). Risk factors for persistent dysphagia after stroke with increased risk of aspiration include persistent obtundation, brainstem stroke (especially with gurgly voice, impaired cough, and coughing while eating), bilateral cerebrovascular accident (especially with impaired cough, and coughing while eating), and aspiration documented by video fluoroscopy modified barium study (Angus, & Burakoff, 2003). Aspiration is a common problem following stroke, resulting in feeding difficulties and aspiration pneumonia (Alberts, Horner, Gray, & Brazer, 1992).

Neurogenic (motor) dysphagia is observed when the nervous system and muscles involved in swallowing are affected. It is caused by uncoordinated, too weak or strengthened peristaltic contractions of muscles (Popova, 1983; Goyal, 1993).

The relevance of the study is due to the fact that neurogenic dysphagia is a life-threatening critical condition; it requires painstaking work for a differentiated, individually selected and integrated application of functionally directed methods of rehabilitation of neurological patients with dysphagia depending on the level of the swallowing act disorder, etiology and localization of the nervous system impairment. Overcoming the swallowing disorder should take a central place in the rehabilitation of neurological patients and should be provided from the earliest period of the disease (Avdyunina, Chernikova, Selivanov, Kuznetsova, Pavlov, Alferova, Andrianova, 2008).

The aim of the research is to develop a system of differential logopedic massage and special exercises to improve the mobility of the lips, tongue, soft palate, pharynx, larynx and vocal cords, mimic and chewing muscles, neck and shoulder girdle muscles depending on the leading neurological syndrome, or a combination violations, which identify a specialist in the diagnostic process.

Hypothesis of research. It is assumed that the use of speech therapy massage and gymnastics will contribute to the normalization of muscle tone involved in swallowing, the formation and restoration of kinesthetic feedback, and the restoration of cortical afferent and efferent links of arbitrary regulation of the swallowing and chewing act.

In the swallowing act are involved 26 muscles, 6 cranial nerves (trigeminal, facial, glossopharyngeal, pneumogastric, spinal branch of the accessory and sublingual nerves) and 3 upper cervical nerves (Rontal, & Rontal, 1977).

During the oral phase, swallowing is arbitrary:

Food and liquid are sent to the mouth, and lips and jaws are closing. To create a front "shutter" of the lips during the throat, facial muscles are activated. In swallowing of water or food that requires chewing, the following chewing muscles are involved, supra- and strap muscles for positioning the hyoid bone and the muscle of the tongue.

Pharyngeal phase of swallowing (1 second):

Three stages can be distinguished.

The first stage is the separation of the nasal and oral parts of the pharynx. In this case, the soft palate rises, approaches the posterior wall of the pharynx and with the simultaneously contracting upper constrictor of the pharynx (Passavant's cushion) forms a "velopharyngeal shutter", which prevents food from entering the nose, and the pressure in the oropharynx changes.

The second stage is the closure of the lower respiratory tract. It is effective if several motor mechanisms function adequately.

- The contraction of the hyoglossus muscle ensures the pressure of the tongue root on the epiglottic cartilage and turns the latter into a "shutter" of the entrance to the larynx.
- The contraction of the suprahyoid muscles lifts and pulls the hyoid bone and larynx, lowering the epiglottic cartilage. In addition, the laryngeal lift is provided by the thyrohyoid muscle.
- The arytenoid cartilage approaches and moves forward, in contact with the epiglottic cartilage.
- The vocal cords are joined. The epiglottic cartilage acts passively in the swallowing mechanism, directing the food flow around the true glottis into the esophagus.

The third stage is cleansing the pharynx, which is facilitated by successive contractions of the pharyngeal constrictor muscles. This wave cleanses all the remains of swallowed food. In this case, the tongue remains pressed to the palate, forming a "palato-glossal shutter", which prevents the return of food to the mouth. Pharyngeal cleansing is impossible without the timely opening of the upper esophageal.

Esophageal swallowing phase (about 4 seconds)

For neurological practice, dysfunction of the upper esophageal sphincter holds more sway (Popova, 1983). It forms a cricopharyngeal muscle (Roman, & Car, 1970; Ekberg, & Lindström, 1987).

During many neurological diseases, arise conditions that lead to the damage or dysfunction of the nerve pathways, controlling the swallowing act -from the cerebral cortex and stem swallowing centers to the peripheral nervous system.

Neurogenic dysphagia can manifest itself with different defects, but more often a combination of several problems that determine the difficulty of swallowing is found (Veis, & Logemann, 1985; Avdyunina, Popova, Dokuchaeva, Bragina, & Dokuchaeva, 2000).

Symptoms of impaired swallowing are individual and may include: weakness of oral muscles with changing food stereotype, oral apraxia, restriction of tongue movements, impossibility of gluing and forming a food bolus, hyposalivation or hypersalivation, decrease in receptor pharyngeal sensitivity and delayed triggering of the swallowing reflex, food delay in the oral cavity and/or pharynx, regurgitation in the nose, dysphonia, dysgeusia, choking, stridor, reducing the cough reflex, etc. (Veis, & Logemann, 1985; Buchholz, 1987; Horner, Massey, & Brazer, 1990; Bakheit, 2001). Deglutitive glottal function during the preparatory phase of swallowing and its coordination with bolus transit during normal eating are important for airway protection (Dua, Ren, Bardan, Xie, & Shaker, 1997). In a normal individual, oropharyngeal secretions are cleared from the hypopharynx by periodic spontaneous swallows throughout the day. In a dysphagic individual, the accumulation of these secretions is thought to reflect an impairment in the efficiency of laryngopharyngeal clearance (Linden, & Seibens, 1983). As a result of its complexity, this physiological process is very susceptible to impairment if there is structural or neurogenic damage resulting in dysphagia (Simons, & Hamdy, 2017).

Neurological syndromes of swallowing disorders:

- violation of the formation offood bolus (oral apraxia);
- pseudobulbar paralysis/palsy;
- Bulbar paralysis/palsy;
- glosso pharyngo laryngeal paralysis/palsy;
- cricopharyngeal paralysis/palsy;
- esophagealdysphagia;
- violations of "respiratory protection";
- violation of air patency of the upper respiratory tract.

Elongation of the oral phase of swallowing is caused by the violation of the food bolus formation.

With occurrence of oral apraxia, an inappropriate formation of an eating bolus is observed. It is commonly known that, apraxia is a violation of arbitrary purposeful actions, a disorder of motor skills with the preservation of their elementary movements. Oral apraxia, aphagopraxia are one of the variants of kinesthetic (afferent) apraxia. Observed with cortical centers swallowing damage and usually are combined with afferent and efferent motor aphasia. If oral apraxia is expected, then it is recommended not to give any verbal instructions to the patient and to avoid complications use only very small hard boluses (as the bolus is swallowed without forming).

Patients with consequences of focal and diffuse damages of the brain and other CNS diseases often have symptomatic complexes of bulbar and pseudobulbar paralysis/palsy. It should be recalled that in both cases the function of the glossopharyngeal, pneumogastric, and sublingual nerves are suffering.

Bulbar syndrome is characterized by impaired function of the cranial nerves, whose nuclei are located in the medulla oblongata. The main characteristic of the disease is general paralysis/palsy of the tongue, pharyngeal muscles, lips, epiglottic cartilage, vocal ligaments and soft palate. Often bulbar syndrome can cause a disorder of the swallowing function, chewing, breathing, phonation and speech.

Less franked degree of paralysis is occurred in cases of ipsilateral nuclear damage of IX, X, XI and XII (caudal group) nerves, their scapus and roots in the medulla oblongata.

Symptoms of bulbar syndrome. Paralysis patients have problems with the consumption of liquid food, often they choke by it, and sometimes they cannot reproduce swallowing movements, because of which saliva can flow from the corners of their mouth. In particularly severe cases of bulbar syndrome, cardiovascular and respiratory rhythm disorders may occur, which is due to the proximity of the nuclei of the cranial nerves of the caudal group to the centers of the respiratory and cardiovascular systems. Such involvement in the pathological process of the cardiac and respiratory systems often leads to a fatal outcome. A sign of bulbar syndrome is the loss of palatine and pharyngeal reflexes, as well as the atrophy of the muscles of the tongue. This is due to the defeat of the nuclei IX and X nerves, which are part of the arc reflexes of the above mentioned reflexes (Vinarskaya, 2009). The most common symptoms of bulbar syndrome are the following: amimia, violation of swallowing and chewing processes, violation of phonation, regurgitation- ingestion of liquid food into the nasopharynx; nasonnement, dysphonia, and dysarthria. In the case of unilateral bulbar syndrome, there is a deviation of the tongue to the not paraplegic side, its twitching, as well as the dangling of the soft palate; impaired breathing; absence of palatine and pharyngeal reflex. The movements of the soft palate are weakened or drop out at all actions- swallowing, vomiting, and speech. Among the manifestations of dysphagia–frank cricopharyngeal inefficiency.

The purpose of logopedic massage when curing dysarthria is to eliminate pathological symptoms in the peripheral part of the speech apparatus.

The main objectives of logopedic massage in the correction of the articulatory part of speech in dysarthria is:

- normalization of muscle tone, overcoming hypo/hypertonicity in the facial and articulatory muscles;
- elimination of pathological symptoms such as hyperkinesis, synkinesis, deviation, etc.;
- stimulation of positive kinesthesia;
- improving the quality of articulation movements (accuracy, volume, switch ability, etc.);
- increase the strength of muscle contractions;
- activation of the thin differentiated movements of articulation organs required for the correction of sound pronunciation (Arkhipova, 2007).

Pseudobulbar paralysis/palsy is observed in bilateral, often uneven, damages of central motor pyramidal corticobulbar neurons, as well as pyramidal neurons that go to the nuclei of the glossopharyngeal, pneumogastric and sublingual nerves. The cells of the central motor neurons are concentrated in the cortex of the frontal central gyrus (left and right), where they are located in the determined somatotopic order. Thus, cells related to the innervation of the movements of the tongue, lips, throat and larynx are in the lowest part of the frontal central gyrus. The whole mass of fibers of the pyramidal tract, going together, passes between the basal ganglia, through the thickness of the white matter of the hemisphere to the basal area of the brainstem.

Disturbances of chewing, swallowing and voice formation usually arise as a result of bilateral damage to the cortico-nuclear pathways. Symptoms of pseudobulbar dysarthria, as well as disorders of chewing, swallowing and voice formation, usually develop in the presence of bilateral central paralysis of the facial and sublingual nerves (Vinarskaya, 2005).

The damage of the central motor neurons in any part of the pyramidal tract clinically causes central paralysis, which, in a number of its features, sharply differs from the peripheral one. There is an increase in muscle tone - their spasticity (central paralysis is spastic paralysis/paresis). Those fibers of the pyramidal tract, which carry cortical impulses to the motor nuclei of the cranial nerves, are called cortico-bulbar nerves. The muscle paralysis that occurs when they are affected has all the features of the described types of central spastic paralysis. There is spastic paralysis of the muscles of the oral-articulatory apparatus. Marked hypertonia muscles (tongue tense, pushed posteriorly); pharyngeal and mandibular reflexes are strengthened. Under load, manual, mimic and oral synkinesia are strengthened - associated movements caused by the increase in muscle tone. Paralysis is always bilateral, although there may be a significant predominance on one side.Arbitrary and involuntary subtle movements of the tongue are suffering. Clinical manifestations of pseudobulbar paralysis can be traced on the example of the study of muscle tone and active movements of the tongue. The tongue, usually pulled posteriorly, the back is raised and closes the entrance to the pharynx. Pharyngeal reflex increased. Pseudobulbar paralysis is characterized by spastic dysphagia, dysphonia and dysarthria; pronounced mandibular reflex (up to trismus); changes in mental and emotional status. With spasmodic contraction of the larynx muscles, the fimbria of the vocal cords is too tightly and too tense connected, and in the space above the glottis chink arise additional noise of friction. Therefore, the voice is not only weak, but also hoarse, rhonchial.

The properties of the main human resonators - the pharynx and the oral cavity, are sharply changed when the central paresis or paralysis of the glossopharyngeal, pneumogastric and sublingual nerves occurs.Normally, during phonation, the epiglottic cartilage rises upward and thus the larynx and pharynx form a single cavity whose resonant properties during speech constantly vary depending on the surge of the anteroposterior and diametrical diameters of this cavity. The spastic condition of the muscles of the neck, larynx, pharynx, soft palate and tongue makes such dynamics of the resonator properties of the pharynx impossible. The larynx stabilizes in a relatively upper position, which reduces the length and volume of the common laryngopharyngeal resonator. Spastically strained tongue moves to the posterior part of the oral cavity towards the posterior pharyngeal wall, which leads to a number of unfavorable consequences. Moved back, the root of the tongue squeezes the epiglottic cartilage and closes the entrance to the larynx, making it impossible to form a single laryngopharyngeal cavity during phonation.

Spastic muscles hypertension is combined with their hyperreflexia.

Hyperkinetic syndrome is caused by a variety of subcortical (extrapyramidal) nuclei damages and a violation of their connections with other brain structures, in particular with the cortex, which leads to a disorder of congenital motor synergism, violation of the coordination of respiration, swallowing and phonation. With lesions of the extrapyramidal system, there are disorders of locomotion, muscle tone and tonic postural activity, congenital automatism, including various muscle synergies; there are hypo- and hyperkinesis (choreoathetosis, tremor, and myoclonus). Extrapyramidal impulses are transmitted contralateral to the cerebellum, from which they already reach the red nucleus with cerebellar corrections and then along the rubrospinal tract-cells of peripheral motor neurons in the scapus and spinal cord.

Ataxic syndrome occur when the scapus and hemispheres of the cerebellum are affected, as well as its connections with other structures of the brain. There is a muscular dystonia - atony and relaxation in a state of rest, and a rapidly growing muscle tone at the slightest load. Static ataxia manifests itself in the phenomena of intension during breathing, swallowing, and voice formation, and the characteristic cerebellar incoordination of the components of the motor act, which is called the phenomena of asynergy, adiadochocinesia, hypo-and-hypermetria, is detected in the speech act by the incoordination of its respiratory, tonic, phonic and articulatory motor components in as a violation of breathing, swallowing, phonation, dysprosody.

Apraxic kinesthetic dysphagia occurs as a result of unilateral cortex damage, usually the left hemisphere of the brain, namely, the lower parts of the postcentral fields. It is represented by kinesthetic oral apraxia with insufficient development or decay, topological spatial schemes of arbitrary oral-pharyngeal postures.

Apraxic kinetic dysphagia occurs as a result of unilateral cortex damage, usually the left hemisphere of the brain, namely, the lower parts of the premotor fields. Kinetic oral-pharyngeal apraxia is caused by insufficient develop-

ment or decay, topological temporal sequential patterns of oral-pharyngeal postures - "kinetic motor melodies" (A.P. Luria).

Mesencephalic - diencephalic dysphagia occurs due to damage to the structures of the limbic-reticular system, primarily mesencephalic-diencephalic. Violations of the nonspecific activity of cortical-subcortical structures that provide motorized sequential realization of oral-pharyngeal acts.

Cricopharyngeal syndrome (cricopharyngeal achalasia) is caused by the absence of adequate relaxation of the superior esophageal sphincter due to the predominance of sympathetic influence (Popova, 1983).

Violation syndrome of "respiratory protection" (incorrectly directed swallow) implies the dysfunction of the "palatine-pharyngeal shutter" and/or inadequate closure of the larynx (violation of the larynx protection).

Violation syndrome of the air permeability of the upper airways is a consequence, and complication of all the syndromes mentioned above, an extreme manifestation of a severe violation of the swallowing act. Dysfunction of the muscles involved in swallowing leads to a blockage of the pharynx and larynx by saliva and mucus with food remnants. Discussing the syndrome of the air permeability of the upper airways, we once again wanted to focus on the most terrible outcome of neurogenic dysphagia - the development of a deadly respiratory insufficiency.

Materials and methods

Methods of treatment and rehabilitation of patients with neurogenic dysphagia:

Medicamental method. The main direction in the pharmacological approach to the correction of neurogenic dysphagia remains treatment of the underlying disease that caused swallowing disorders.

The dietic method involves choosing food of a certain consistency, swallowing which would be safe and effective.

Thermal, tactile and taste stimulation involves the use of an acidic or cold bolus or bolus that requires chewing with the use of a nibbler.

Physiotherapeutic method. Electrotherapy has long been recognized and widely used in neurological rehabilitation.

Transcutaneous electrotherapy. In Germany, the concept of neuromuscular electro-phonopedic and neuromuscular electro-articulatory stimulation was developed using the so-called prescribed (deliberate) Foerster exercises, under the supervision of video endoscopy, which provides feedback. It is implemented in the device "vocaSTIM" (PHYSIOMED Electromedizin, Germany) and it is well suited for electrotherapy and diagnosis of paresis of the larynx, pharynx, tongue and face

A substitution method with nutritional support means feeding with using liquid forms of food or mixtures that pass into the intestines through tubes that can be placed through the mouth or nose or transcutaneous.

Compensatory method (Logemann, 1997). Compensatory medical techniques transform the pharynx and the direction of the food flow, thus preventing aspiration or bolus delay.

Positional (postural) techniques suggest a change in the position of the head or body of the patient. If the formation of the food lump is broken for effective cleaning of the oral cavity, the head deflection is reversed. Conversely, with limited movements of the root of the tongue (when food is collected in the vallecular sinus),putthe chin downward, which pushes the root of the tongue back to the pharyngeal wall and improves the protective position of the epiglottis.

Turning the head to the defective side is useful for unilateral paralysis of the vocal cords or pharyngeal paresis; the head should be tilted in the opposite direction from the remainder: in this case, the bolus will pass through the healthy side due to gravity.

Feeding on one side will help swallow when food sinks all over the throat, as it removes the gravitational effect.

Individualization of volume and speed of food delivery. To compensate for dysphagia, the way to take liquids and food is also important.

The training method is aimed at changing the physiology of swallowing.

Efforts are used to increase the strength, volume, speed, target accuracy of movements of the muscles of the neck, head, lips, pharynx, larynx and vocal cords.

"Direct" therapy, when patients exercise and practice swallowing techniques, using small amounts of food or liquid.

"Indirect" therapy -training is done only with saliva. In order to get the best effect of using the training method, the patient needs an understanding of the instructions and their execution, an awareness of the usefulness of performing such tasks, and the desire to practice on their own. Thus, rehabilitation of swallowing disorders should include active psychological and pedagogical work aimed at restoring the patient's consciousness and overcoming cognitive deficiency.

The use of speech therapy massage and gymnastics is necessary to normalize the tone of muscles involved in swallowing, to improve their coordination, to form and restore kinesthetic feedback and restore cortical afferent

and efferent links of arbitrary regulation of the swallowing and chewing act. Depending on the leading neurologic syndrome, or a combination of disorders that the specialist identifies during the diagnosis, differentiated logopedic massage and special exercises are used to improve the mobility of the lips, tongue, soft palate, pharynx, larynx and vocal cords, mimic and chewing muscles, neck muscles and the shoulder girdle.

Logopedic massage is an active medical method, the essence of which is reduced to the application of metered mechanical stimuli to the muscles of the oral-articulatory apparatus and the collar zones by methods performed by a specialist's hand or with the help of various devices.

Logopedic massage has a multifaceted impact on the body and, above all, on the nervous system. In the central nervous system, conditions are created for the normalization of the relation between the cortical, subcortical and downstream segments. It has been proved that under the influence of massage, the excitability of the nervous system may increase or decrease depend on its functional state and the technique of action. Blood circulation, oxidation-reduction and metabolic processes in the nervous tissue improve, which, in turn, positively influences the dynamics of nervous processes. Increases muscle efficiency, decreases tone in spastic muscles and significantly increases with soft paresis of muscles, pathological motor synkinesia is suppressed, relaxation of mimic and oral musculature is achieved. To achieve maximum efficiency during massage, the speech therapist must have a good idea of the mechanism of the disorder, as well as know the anatomy of the muscles and the area of the nerves of the head, neck, and shoulder girdle.

Physiological effect of massage: The mechanism of the massage is based on complex interdependent reflex processes regulated by the higher parts of the central nervous system. As a result of the massage, various reactions occur in the body. They are not independent, but represent a generalized reaction of a reflex character, thanks to which the protective and adaptive forces of the organism are mobilized, which lead to the normalization of its function under a variety of disorders, including speech disorders.

Mechanical irritation in the form of massage causes deformation of the nerve endings of the skin. The nerve impulses that appear in it enter the central nervous system. Consequently, the energy of massage manipulations turns into energy of nervous excitation, which is the initial link of the chain of nervous-reflex reactions in the mechanism of the massage action on the body. Excitations of receptors in the form of centripetal (afferent) impulses are transmitted along sensitive pathways to the central nervous system (spinal cord, cerebellum, functional formations of the brain stem, etc.), then reach the cerebral cortex where they are synthesized into a general complex reaction and cause various functional shifts in the body.

With the right choice of massage techniques and methods of their use, there is a feeling of pleasant warmth and improvement of well-being.

Massage affects:Nervous system: under the influence of massage, the functional state of the conducting pathways is improved; various reflex connections of the cerebral cortex with muscles, vessels and internal organs are amplified. Deeply influenced by massage on the peripheral nervous system, relaxing or stopping pain, improving the conductivity of the nerve, accelerating the regeneration process when it is damaged, preventing or reducing vasomotor sensory and trophic (nutritional) disorders, the development of secondary changes in muscles and joints on the side of nerve damage.

Circulatory and lymphatic system: massage causes expansion of functioning blood capillaries, opening of reserve capillaries, due to which abundant irrigation is created not only by the mass of the massed area, but also by the reflex, and at a great distance from it, as a result of which gas exchange between blood and tissue increases, oxygen therapy of tissues takes place.

Under the influence of massage, skin lymphatics are easily emptied and the lymph flow is accelerated. In addition to direct effects on the local lymphatic flow, the massage has a reflex action on the entire lymphatic system, improving the tonic and vasomotor function of the lymph tubes.

Total metabolism: massage causes a variety of changes in the flow of oxidation-reduction processes.

Muscular system: under the influence of massage, the elasticity of muscle fibers increases, their contractile function, muscle atrophy slows down, and already developed hypotrophy decreases.

Differentiated application of various massage techniques allows depressing tone with spasticity of muscles and, on the contrary, to increase it the case of soft paresis of articulatory muscles, that helps the formation and implementation of active voluntary, coordinated movements.

Logopedic massage contributes not only normalizing the muscles tone of the articulatory apparatus, the development of strength, mobility and accuracy of movements, but also to the development of kinesthetic sensations.

Neuromotor disorders in dysphagia have a single pathogenetic basis with motor impairment, and characterized by diversity. Thus, with lesions of the subcortical-cerebellar nuclei and conducting pathways, are observed changes associated with increased muscle tone, reciprocal innervation (interaction of the muscles of antagonists and agonists), sequence, force, volume, and rate of muscle contractions are suffering. In extrapyramidal disorders, in addition to changes in muscle tone, violent movements (hyperkinesis) appear in the musculature.

At the level of the peripheral motor nerves, the innervating muscles of the speech apparatus (tongue, lips, cheeks, soft palate, lower jaw, pharynx, larynx, diaphragm, thorax), metabolic processes are violated, and the supply of nerve impulses to muscles changes, and some reflexes disappear. The volume of voluntary movements is limit-

ed, with a significant decrease in tone in certain muscle groups, its increase is observed.

In the process of restoration work, along with medicamental and physiotherapeutic treatment, a differentiated logopedic massage is performed.

In the process of overcoming dysphagia, various forms of logopedic work are carried out: breathing exercises, stimulation of phonation, restoration of higher mental functions, including impressive and expressive speech etc.

Since speech therapy massage holds more sway in the normalization of the functional state of the higher nervous activity of the patient, it is advisable to conduct each individual activity under quiet melodic music, preferably piano.

If there is a marked spastic symptomatology - the main purpose of the massage is a soothing, and relaxing effect. Techniques aimed at improving blood circulation are applied very carefully, always alternating with relaxing, and effleuraging movements.

If signs of damage to the corticonuclear tract are determined (spasticity of the articulatory musculature, restriction of the volume of voluntary movements, tremor of the lips, tongue expulsive spasm), in these cases, the main purpose of massage techniques, in addition to relaxation, is an increase in receptor activity. This, in turn, causes the appearance of impulses reaching the corresponding centers of the brain with the subsequent regulation of afferent impulses.

Priority is the tricks of stroking, soft vibration "finger shower", sometimes - kneading. At the same time metabolic processes are improved, muscle capacity is increased. Differentiated afferentation should be given by a speech therapist to the muscles of the palpebral fissure, mouth cavity, chewing muscles, external and internal muscles of the tongue, and muscles of the neck, chest and shoulder girdle.

After massage, a decrease in the tone of spastic muscles and an increase in the tone of patients with soft paresis, respectively, decrease or increase the pharyngeal reflex, the function of the epiglottis cartilage and soft palate is restored.

If there is hyperkinetic symptomatology: a changing muscle tone, violent movements, a violation of reciprocal innervation, a sharp increase in tone, massage effects should be light one, and the slow tempo of warm hands, with a gradual increase in the depth of immersion in tissues. More active techniques alternate with relaxing movements. Mainly easy effleuraging is used.

When flaccid paresis on the background of a relaxing, soothing massage is occurred, work is carried out by using grinding, kneading, jerky and vibrating massage techniques. This improves the contractile function of individual muscle groups, massage movements cause hyperemia, increase blood supply, amplify afferent impulses.

The main method of massage is stroking, mandatory reception, which starts each procedure. This method alternates with the others and accomplishes each massage complex. With the use of stroking, blood circulation in interfacial vessels increases, and even in vessels far from the massaged area; the muscle tone decreases, respiration slows down, which in itself is regarded as a manifestation of the processes of inhibition of the higher parts of the central nervous system with subsequent lowering of excitability. Along with this, deeper and more vigorous effleuraging has an exciting effect on the central nervous system.

Relaxation of muscles begins with the so-called "general muscle relaxation," namely, with relaxation of the cervical, chest muscles, arm muscles, and the shoulder girdle. Then the specialist conducts a relaxing facial massage. The movements of the hands should be light, gentle, gliding, soothing, and coinciding with the musical accompaniment.

Interfacial effleuraging is a gentle, "sparing" reception. The palms of a specialist should be as relaxed as possible. This technique is used to reduce the tone of articulatory muscles.

Deep effleuraging is a more intense technique. It is used to influence the receptors of deeply "embedded" muscles and blood vessels.

Kneading is performed with the use of considerable pressure on the massaged area. It significantly enhances blood circulation, metabolic and trophic processes in tissues, contractile muscle function, and tone increases.

Intermittent vibration or effleurage has a different effect. Weak pinching increases muscle tone, and a strong or "staccato" reduces the increased muscle tone and nerves affectability.

Dense pressing - improves blood circulation, lymph circulation, and metabolic processes, strengthens motor reflexes, and significantly increases muscle tone.

Results and Discussion

Speech massage and training exercises: Suprahyoid muscles (biventral, stylohyoid, mandibulohyoid, mentohyoid).

Postisometric relaxation- the patient's position is lying on his back. The speech therapist sits or stands at the head of the bed. One hand covers the lower jaw. The thumb and forefinger of the other hand are fixed and slightly shifted to the side of the hyoid bone.

Exercise: 1. The speech therapist performs a preliminary passive stretching of the muscles, increasing the displacement of the hyoid bone with a small effort until a light yielding comfortable feeling of tension of the tissues ("elastic barrier") and holds it 3-5 seconds - for adaptation of the muscle to stretching.

2. The patient looks away from the movement restriction, slowly and gently inhales, holds his breath and tries to cut the muscles with a minimum effort against adequate light resistance of the specialist for 7-9 seconds.

3. The patient exhales slowly and smoothly, smoothly relaxes the muscles and shifts his gaze toward the restriction of movement - displacement of the hyoid bone, and the speech therapist performs an additional soft, smooth passive stretching of the muscles with minimal effort, keeping the lower jaw from displacement, until some yielding tension of the tissues or until easy soreness will occur for 5-10 seconds. In this new stretched position, the muscles are fixed by tension to repeat isometric work.

4. Method is repeated 4-6 times without interrupting the tensile force between repetitions by carefully holding the muscles in the stretched state and without returning it to the neutral position.

Infra-hyoid muscles (sternal, sternohyoid, thyrohyoid, omohyoid muscle).

Postisometric relaxation: The patient lies on the back; the shoulders are located at the level of the head end of the couch. The speech therapist sits or stands at the head of the bed. With the thumb and forefinger of one hand, the hyoid bone is fixed, and the other arm hand supports the patient's head slightly tilted back, fixing by the forearm of the same hand patient's scapula at the level of scapular spine.

Exercise: 1. the speech therapist performs a preliminary passive stretching of the muscles, increasing the displacement of the hyoid bone with a small effort until a light yielding comfortable feeling of tension of the tissues ("elastic barrier") and holds it 3-5 seconds - for adaptation of the muscle to stretching.

2. The patient looks up, slowly and gently inhales, and holds his breath for 7-9 seconds.

3. The patient slowly and gently exhales, smoothly relaxes muscles and looks down.

4. Method is repeated 4-6 times without interrupting the tensile force between repetitions by carefully holding the muscles in the stretched state and without returning it to the neutral position.

Suprahyoid and infrahyoid muscles:
Undifferentiated postisometric relaxation- sitting position. Speech therapist is behind. One hand is located on the lower jaw, the other hand is on the manubrium of sternum.

Exercise: postisometric relaxation:
1. The specialist performs a preliminary passive stretching of the muscles, producing a slight extension of the head upwards with simultaneous pressure on the manubrium of sternum upwards by a small effort until a light springing comfortable feeling of tension of the tissues (elastic barrier) is established and retains it for 3-5 seconds to adapt the muscle to stretching.

2. The patient looks down from the side from the movement restriction, slowly and gently inhales, holds his breath and tries to cut the muscle with a minimum effort against adequate light resistance for 7-9 seconds.

3. The patient exhales slowly and smoothly, gently relaxes muscles and looks upwards towards the restriction of movement, and the specialist performs an additional soft smooth passive stretching of the muscles, strengthening the extension of the head with simultaneous pressure down the manubrium of sternum with minimal effort until some springy resistance and tension of the tissues, or until mild pain occurs within 5-10 seconds.

4. Method is repeated 4-6 times without interrupting the stretching force between repetitions by carefully holding the muscles in the stretched state and without returning them to the neutral position. Independent postisometric relaxation is performed in the patient's sitting position in the same way. For isometric loading and subsequent stretching, the patient fixes his hands as if fixing a specialist's hands.

To control the bolus, chewing exercises are best done using gauze fabric. The amplitude of the movement in the intended direction should cause a feeling of strong stretching, which is held for a second, followed by relaxation. The opening (with an increase in the cross section area) of the upper esophageal sphincter due to the larynx raising is promoted by a regular head lift for a minute without lifting the shoulders from the lying position on the back.

Swallowing maneuver (swallow maneuver) is designed to relocate specific aspects of the pharyngeal physiology to arbitrary control. At present, four swallowing maneuvers have been developed (Jacob, et al., 1989).

a) supraglottic swallow – a swallow under the true glottis;

b) supersupraglottic swallow – a swallow under the false vocal cords;

c) effortful swallow – a swallow with a load;

d) Mendelssohn's maneuver.

It should be noted that the implementation of swallowing maneuvers requires not only cooperation, but also increasing muscular efforts. In this regard, this training is not suitable for patients who are easily tired or have cognitive impairments.

Direct therapy is used when the patient can successfully swallow without aspiration even small amounts of viscous liquids or food. This is the best exercise for correcting dysphagia, since swallowing in itself requires greater muscular effort than other motor functions of the oropharyngeal region. Therefore, direct therapy should always be encouraged if it is safe. Feeding with an increase in the food lump, with different types of food, with various verbal commands and instructions of varying consistency is used

(Smithard, Renwick, & O'Neill, 1993). With the weakness of the constrictors of the pharynx, alternating liquid and solid food boluses is recommended.

Indirect therapy is a program of exercises that exclude the giving of food or liquid and are performed only with saliva. Indirect therapy is used in patients who aspirate food of any viscosity and volume, despite the use of compensatory strategies. All the above therapeutic methods, except of swallowing maneuvers, can be performed directly (with food) or indirectly (with saliva). Indirect and direct therapy can be combined.

Improvement of sensorimotor integration occurs with thermal/ tactile stimulation and swallowing accompanying sucking. All treatment and rehabilitation strategies / interventions are determined during diagnostic radiographic (or endoscopic) research.

To develop sufficient strength of articulatory muscles should be used special exercises with resistance. In this case, the impulses that have arisen in the muscles are transmitted to the antagonist muscles and the work of the affected muscles is activated.

Exercises for the lips:

1. The patient grasps the tubule with his lips and tries to hold it, despite the adult's attempts to pull it out of his mouth.

2. Lips are not tense. The speech therapist fixes the corners of his lips with his fingers and asks him to paint a smile with force. Fingers from the corners of the lips tear off at the time of the most intense tension.

3. The speech therapist asks the patient to smile. Fixing the fingers of the corners of his lips in a smile, he suggests pulling them into a tube. He tears his fingers from his lips at the moment of their most intense tension.

Exercises for the tongue:
1. The tongue on the lower lip. Speech therapist asks to remove the tongue in the mouth. The speech therapist tries to keep the tongue in its original position by sterile napkin and squeezes the fingers at the moment of the highest tension in the root of the tongue.

2. The tongue is in the oral cavity of the lower teeth. The speech therapist presses the finger on the tip of the tongue (fixes it). Then he asks with a force to stick out his tongue, pushing out his finger. With the strongest tension of the tongue back, the finger should be raised.

With the help of these exercises, the patient acquires kinesthetic self-control, it is better to begin to feel the movements that are being performed.

Massage of cervical, facial and glossal musculature. Before the massage it is desirable to put the patient in the light of the reflex-prohibiting position of the body. Massage should be started by planar and surface strokes along the line of the upper epistropheus on the posterior surface. Neck massage should be started from the sides of the neck. Effleuraging movements should be made from the top down along the lymph tubes. After massage of the cervical musculature, passive movements of the head need to be made: circular rotations are performed at a slow rate in a clockwise and counterclockwise order. Then, they return to the massage of the facial musculature again. In this syndrome there is a great strain of the oral musculature, the musculature of the upper thoracic girdle (often in the muscles of the lower jaw, the root of the tongue, the upper lip). Therefore, relaxation should begin with the muscles of the neck.

In the cases of tonic disorders of the rigidity type, several other methods of massage are used, than with spastic paresis. Deep entwine and intermittent effleuraging in these disorders is not used, because it is possible to increase spasm and even the appearance of tonic hyperkinesis. Especially carefully should be used "pressure methods", as often pressure on the muscles causes a response reflex increase in tone. Speech therapist should react to convulsive reaction and instantly stop movements.

Normalization of speech muscles in hyperkinetic syndrome is carried out to a greater extent by the methods of active and passive movements than by the use of massage. Massage techniques are limited in these cases by surface planar effleuraging, and movements should be very soft. The neck muscles, the neck, the shoulder girdle, the chest, the lateral trunk muscles are effleuraging along the lymph tubes.

With spastic paresis of articulatory muscles, another set of massage exercises is recommended.

Massage of facial and glossal musculature. Before the massage, it is necessary to consult with a doctor in exercise therapy or neurologist about the safety or absence of musculoskeletal reaction (because the patient may have excessive muscle tension when touching the face). First, a planar effleuraging is performed. The movements are soft and barely perceptible. Massage should be started from the chin from both sides to the temporal recess. Effleuraging should be carried out by sliding movements of hands, first hardly touching the skin, and then easily pressing on the muscles. It is necessary to press stronger on the places of the muscles attachment and their interweaving. Deep effleuraging is carried out in the muscles accessible to the isolated action: frontal, buccinator, quadrangular muscles of the upper and lower lips, triangular muscle, mentalis, round muscles of the lips, muscles that abduces lips to the sides. After sequential deep effleuraging (5-6 movements) you need to move on to a grasping sequential and intermittent effleuraging.

The next massage technique that is used for spastic paresis is vibration. Vibration can be done manually and with the help of mechanic devices. Vibration should last no more than 3-5 minutes.

In the process of the tongue massage, it is important to massage the longitudinal, vertical muscle of tongue and transverse muscles more closely. Especially it is necessary to pay attention to massage of the mandibulohyoid muscles (in the neck muscles), also the muscles of the anterior region of the neck, sternoclavicular mastoidal muscle and larynx.

For vibration on the larynx, speech therapist should grab it with your thumb and forefinger and produce rhythmic vibrational movements in the longitudinal and transverse directions. After the massage passive gymnastics is performed. In ataxic syndromes, as well as in spastic paresis, the same massage techniques are used to normalize afferentation. One of the main methods is the reception of kinesiatrics.

Relaxation of the facial and labial muscles.

Relaxation is carried out by the method of smoothing:

- in the direction from the temples to the middle of the forehead;
- from the eyebrows to the hairy part of the head;
- down from the line of the forehead across the face to the neck;
- from earlobes on the cheeks to the nose alae;
- on the upper lip from the corner of the mouth to the middle;
- on the lower lip from the corner of the mouth to the middle.

Movements should be soft, effleuraging, in slow motion. Each movement must be executed 4-7 times. Massage should not exceed 3 minutes.

Lips relaxing:

- effleuraging nasolabial cordsfrom the nose alae to the corners of the lips;
- effleuraging the upper and lower lips towards the center;
- tapping of the lips;
- pointillage of the lips.

Each massage movement is performed 6-8 times per day.

Relaxation of the neck muscles: After light relaxing movements on the facial and labial muscles passive head movements are carried out. The right hand of the speech therapist is brought under the head and slowly, smoothly turning his head in one direction and the other swing slightly. Relaxation of the cervical musculature causes some relaxation of the root of the tongue.

Relaxation of the tongue and correction of its pathological form:Massage of the tongue should be carried out after a general relaxation:

- pointillage in the submandibular fossa should be providedfor 15 seconds with vibrating movements of the index finger under the lower jaw;
- vibration with two index fingers of both hands at the corners of the lower jaw (15 seconds);
- easy patting and effleuraging the tongue with a wooden trowel, which is stitched on the tip of the tongue. This massage exercise is performed for 15 seconds between 3-5 times every day.

At the expressed flaccidity -a hypotonia of an oral musculature spend special receptions of the massage directed on strengthening of muscles of this zone.

Stimulation and activation of the facial musculature and suprahyoid muscles:

- effleuraging the forehead from the middle to the temples;
- effleuraging the cheeks from the nose to the ears;
- effleuraging from the chin to the ears;
- kneading of the zygomaticus and buccinator muscles is performed by the index and middle fingers of both hands, in the direction from the temple along the cheekbone and cheek muscles to the chin. After 4-5 movements, the intensity of the motions increases. Movements become pressing, but not painful and do not cause negative reactions.

Strengthening of the labial musculature.

Provide effleuraging, rubbing, kneading and vibration of the lips:

- from the middle of the upper lip to the corners of the lips;
- from the middle of the lower lip to the corners;
- effleuraging nasolabial cordsfrom the corners of the mouth to the nose alae;
- tingling lips.

Strengthening of tongue musculature.

With lethargic tongue, massage is performed with a wooden spatula:

- Massage the longitudinal muscles, with a spatula effleurage the tongue from its middle part - the back - to the end of the tongue;
- with the help of rhythmic pressure on the tongue vertical muscles are strengthened;
- in the process of effleuraging the tongue from side to side, they affect the diametrical muscles;
- light vibrating movements, transmitted by the tongue through the spatula for 5-10 seconds, contribute to the activation of the muscles of the tongue.

All these movements are carried out 4-6 times.

Thus, the massage is performed with the aim of weakening the pathological manifestations in the muscles of the articulatory apparatus, expanding the possibilities of movement of the speech muscles and including them in the process of pronunciation. In addition, to activate the muscles of the speech apparatus, articulatory gymnastics is used.

Strengthening the muscles of the face.

- from the middle of the forehead to the parotid area;
- from the base of the nose and upper half of the cheeks to the angle of the lower jaw;
- from the nose alaeand the lower part of the cheek to the submaxillary gland.

Forehead massage.

- planar effleuraging, which does not cause skin reddening. The frontal and temporal muscles are massaged. Direction - from the middle of the forehead to the temples, where spiral effleuraging is produced;
- direction from the superciliary arch to the hairy part of the head;
- the subsequent easy grinding is carried out by spiraling movements in the same directions;
- then these directions are massaged in the form of tweaks.

Massage the orbital region:
Massage is performed with closed eyes. The dormator muscle with the palm-like surface of the nail bone of the third finger is provided. In the direction of the temporal fossa, above the arcus zygomaticus to the inner corner of the eye. Then along the upper edge of the eyes with two fingers to the temporal areas, sliding very gently with the second finger above the eyebrow, and the third under the eyebrow.

Massage of cheeks:
- superficial effleuraging is performed in the direction from the nose up to the arcus zygomaticus;
- from the nose to the ears;
- from the nose to the temples;
- Then rubbing and kneading are carried out in the same directions.

Massage of the nose:

When the nasolabial fold is flattened, the following movements are carried out: the fingers are located along the fold at a distance of 2.5 mm, while moving the fingers are connected from both sides.

Conclusions

Dysphagia is a vital dysfunction, which restoration should be central in the treatment of a neurological patient, as it largely depends on the success of the entire rehabilitation. Difficulty swallowing, as risk factors for aspiration and pneumonia up to respiratory failure, dehydration and poor nutrition, often lead to poor functional prognosis (Avdyunina, Grechko, & Bruno, 2016). Dysphagia is considered a disabling condition for an individual as far as concerns both the functional, as well as the emotional-relational aspects (Farri, Accornero, & Burdese, 2007).

- Dysphagia is frequent among patients with critical illness polyneuropathy treated in the ICU. Old age, chronic obstructive pulmonary disease, the mode of mechanical ventilation, the prevalence of tracheal tubes, and behavioral "learned nonuse" may all be contributing factors for the development of dysphagia in critical illness polyneuropathy(Ponfick, Linden, & Nowak, 2015).

Thus, overcoming the swallowing disorder should occupy a central place in the rehabilitation of neurological patients and be ensured from the earliest period of the disease; neurogenic dysphagia is a life-threatening critical condition. The painstaking work of the interdisciplinary team of specialists is required, including psychological and pedagogical personalized rehabilitation, for differentiated, individually selected and complex application of functionally directed methods of treatment and rehabilitation training of neurological patients with dysphagia.

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