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Evaluation of Neurological Therapy in a Patient with Ataxic-Spastic Dysarthria and Neurogenic Dysphagia in the Course of Multiple Sclerosis

Ocena terapii neurologopedycznej pacjentki z dyzartrią ataktyczno-spastyczną oraz dysfagią neurogenną w przebiegu stwardnienia rozsianego

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Abstract

Introduction. Multiple sclerosis, in which there is continuous Central Nervous System damage due to chronic demyelination, is one of the most common causes of neurogenic dysphagia. Failure to adequately manage patients with dysphagia and weakness of the muscles responsible for swallowing can lead to aspiration of food or liquids into the airways, resulting in aspiration pneumonia.

Aim. This study aimed to evaluate neurological therapy in a patient with ataxic-spastic dysarthria and neurogenic dysphagia in the course of multiple sclerosis. In dysphagia therapy, the priority was to improve soft palate and upper esophageal sphincter function.

Case Report. The patient, aged 52, has suffered from Multiple Sclerosis for 28 years. Neurogenic dysphagia — EAT-10 test score =16 points and DYMUS test score =9 points. Poor oral control with leakage of saliva and fluids into the throat before triggering the swallowing reflex. Periodic nasal leakage during drinking due to soft palate dysfunction and velopharyngeal insufficiency. Incidental coughing and choking after swallowing solid foods due to delayed swallowing reflex. Sensation of throat obstruction and pain during swallowing and the need to swallow a bite several times due to soft palate dysfunction and upper esophageal sphincter opening disorders. In realisation speech, there are disorders of mixed dysarthria (ataxic-spastic), as well as the so-called scanning and explosive speech (irregular symptoms).

Discussion. The knowledge and skills acquired to manage swallowing disorders and dysarthria have enabled the patients to restore, as far as possible, the physiological conditions of swallowing and word formation. Early recognition of dysphagia and dysarthria in multiple sclerosis enables the implementation of therapy to improve primary functions and articulation of sounds, which not only affects the patients' quality of life, but also minimises the risk of disorder-related complications.

Conclusions. As a result of therapy, there has been an improvement in mouth and cheek muscle tone, oral movements and tactile and thermal sensation. During a repeat breathing test, the average phonation time in three attempts was close to the lower limit of normal at 19 seconds (4 seconds more). There has been a lengthening of the inspiratory and expiratory phases and phonation time, as well as an improvement in the coordination of the speech and breathing apparatus. With work on melody and accent, an improvement in prosody has been noted as well. **(JNNN 2025;14(2):91–100)**

Key Words: dysarthria, dysphagia, multiple sclerosis, neurological speech therapist, therapy

Streszczenie

Wstęp. Stwardnienie rozsiane, w którym stale dochodzi do uszkodzeń Ośrodkowego Układu Nerwowego w wyniku przewlekłej demielinizacji jest jedną z najczęstszych przyczyn dysfagii neurogennej. Brak odpowiedniego postępowania u chorych z dysfagią i osłabieniem mięśni odpowiedzialnych za połykanie może doprowadzić do aspiracji pokarmu lub płynów do dróg oddechowych, czego konsekwencją może być zachłystowe zapalenie płuc.
Cel. Celem pracy była ocena terapii neurologopedycznej pacjentki z dyzartrią ataktyczno-spastyczną oraz dysfagią neurogenną w przebiegu stwardnienia rozsianego. W terapii dysfagii priorytetem była poprawa pracy podniebienia miękkiego i pierścienia zwierającego gardło.
Opis przypadku. Pacjentka, lat 52, chorująca na stwardnienie rozsiane od 28 lat. Dysfagia neurogenna — wynik testu EAT-10 =16 pkt a testu DYMUS =9 pkt. Słaba kontrola oralna z wyciekiem śliny i płynów do gardła przed wyzwoleniem odruchu połykania. Okresowo wyciek z nosa podczas picia spowodowany niewydolnością podniebienia miękkiego i nieszczelnością zwarcia podniebienno-gardłowego. Incydentalnie kaszel i dławienie się po połknięciu pokarmów stałych w wyniku opóźnionego odruchu połykania. Uczucie przeszkody w gardle i bólu podczas przełykania oraz konieczność kilkukrotnego przełknięcia kęsa spowodowana niewydolnością podniebienia miękkiego i zaburzeniami otwarcia górnego zwieracza przełyku. W mowie realizacyjnej występują zaburzenia o charakterze dyzartrii mieszanej (ataktyczno-spastycznej) tzw. mowa skandowana, wybuchowa (obserwuje się nieregularność objawów).
Dyskusja. Zdobyta wiedza i umiejętności radzenia sobie z zaburzeniami połykania i dysartrią pozwalają pacjentom na odtworzenie w możliwie jak najpełniejszym zakresie fizjologicznych warunków połykania i formułowania wyrazów. Wczesne rozpoznanie dysfagii i dysartrii w stwardnieniu rozsianym pozwala na wdrożenie postępowania terapeutycznego poprawiającego funkcje prymarne i artykulację dźwięków co wpływa nie tylko na jakość życia pacjentów, ale też minimalizację ryzyka powikłań zaburzeń.
Wnioski. W wyniku terapii doszło do poprawy napięcia mięśni ust i policzków, ruchów w obrębie jamy ustnej oraz czucia dotykowego i termicznego. Podczas powtórnego badania oddychania, średni wynik czasu fonacji w trzech próbach był bliski dolnej granicy normy i wyniósł 19 sekund (o 4 sekundy więcej). Nastąpiło wydłużenie fazy wdechowej i wydechowej, czasu fonacji oraz polepszenie koordynacji aparatu mowy z oddechowo-fonacyjnym. Dzięki pracy nad melodią i akcentem nastąpiła poprawa prozodii. **(PNN 2025;14(2):91–100)**
Słowa kluczowe: dysartria, dysfagia, stwardnienie rozsiane, neurologopeda, terapia

Introduction

Multiple sclerosis (MS), in which there is continuous Central Nervous System damage due to chronic demyelination, is one of the most common causes of dysarthria and neurogenic dysphagia. Patients with multiple sclerosis struggle with the constant progression of the disease as a result of chronic demyelination of the central nervous system. Muscle dysfunction negatively affects both speech motor skills and swallowing in these patients [1–4].

Failure to adequately manage patients with dysphagia and weakness of the muscles responsible for swallowing can lead to aspiration of food or liquids into the airways, resulting in aspiration pneumonia. The therapist's task is to take a variety of measures that will improve speech and swallowing, thereby reducing the risk of dangerous complications and improving the patient's quality of life [4–6].

Cranial nerve damage in patients with MS results primarily in dysfunction of the optic, oculomotor and trigeminal nerves. The most common symptom is optic neuritis, causing deterioration of visual acuity and even blindness. One characteristic symptom in MS patients is nystagmus, usually horizontal. Trigeminal neuralgia, which is sometimes the first symptom of the disease in young people, can also occur in the course of multiple sclerosis. Damage to the cerebellum and medulla oblongata can cause dizziness, resulting in vomiting. In addition, there occurs imbalance resulting in tipping to one side. The impact of this progressive demyelinating disease on cognitive difficulties is increasingly recognised. Secondary symptoms in MS mainly include depression and pain states associated with paresis [5–7].

A very common phenomenon in the course of MS is the occurrence of dysarthric disorders. Dysarthria is defined as a group of motor speech disorders that results from focal, multifocal or diffuse damage in the nervous system. The changes that occur affect the executive language functions, i.e. articulation, phonation and prosody (rhythm, accent, tempo, intonation). Dysarthric changes occur as a result of damage to the speech motor system, including cortical and subcortical centres, as well as the respiratory, phonatory and articulatory systems [5,6,8,9].

Ataxic dysarthria (caused by damage to the cerebellum) is most common in the course of MS; its clinical picture is characterised by uncoordinated movements of the articulatory organs. Speech becomes slurred, especially under the influence of strong emotions. There are breaks in articulation, prolongation of sounds and inter-word breaks. Speech tempo is usually slowed down and speech prosody is disturbed, with incorrect intonation and accent. Speech becomes irregular, explosive and scanning. Another type of dysarthria in MS is spastic dysarthria resulting from damage to the pyramidal tract. The

progressing damage causes increased spastic muscle tension. Due to damage to the articulatory muscles, the speech tempo is slowed down. As there is paresis of the lower part of the face, the movement of the mandible is severely restricted. The voice becomes low and hoarse, and speech prosody is disturbed. In spastic dysarthria, there are components of pseudobulbar syndrome with characteristic emotional dysregulation with no apparent cause. Because of the various demyelinating foci in MS, dysarthria in this disease can take on an ataxic-spastic form [9–11].

In the course of multiple sclerosis, patients struggle with swallowing disorders as often as with dysarthria. Failure to adequately manage patients with dysphagia and weakness of the muscles responsible for breathing can lead to aspiration of food or liquids into the airways, resulting in aspiration pneumonia. Dysphagia is a disorder that involves the ingestion and passage of food from the mouth to the pharynx and esophagus and is associated with discomfort in swallowing [4,6,12].

Neurogenic dysphagia in the oral phase results from paralysis or paresis of the cranial nerves — facial, sublingual and trigeminal [13].

The main symptoms of neurogenic dysphagia are as follows:

— leakage of fluids through the nose;
— a sensation of food getting caught in the throat;
— choking on food and liquids;
— ineffective swallowing and difficulty swallowing food;
— problems with excessive salivation due to an inability to swallow saliva.

Therapy of dysphagia is based on such methods as:

1. Restorative methods — restoring the sensory and neuromuscular basis for physiological swallowing. Control of body position, as well as respiratory, sensory and motor skills, are vital in this respect.
2. Compensatory methods — changes in body positioning while eating and using techniques and exercises to facilitate swallowing [14].
3. Adaptive methods — changing habits that exacerbate swallowing problems and modifying the consistency of food.

The study used the individual case method. The tools used in the study included an interview and observation of the patient, analysis of medical records, cranial nerve testing, the Dysarthria Assessment (OSD) test by Izabela Gatkowska, the EAT-10 questionnaire, the DYMUS questionnaire, as well as the Maximum Phonation Time test, which involves the patient trying to say the [a] vowel as long as possible on one breath. Phonation time is measured in its course. The result is the average value from three measurements [15–17]. The normal value for people with an efficient phonatory system is 20–25 seconds. A value below 10 seconds indicates significant dysfunction within the phonatory and respiratory system. The patient's condition was assessed before starting speech therapy and after 5 months of it (1× per week for 60 min).

This study aimed to evaluate neurological therapy in a patient with ataxic-spastic dysarthria and neurogenic dysphagia in the course of multiple sclerosis. In dysphagia therapy, the priority was to improve soft palate and upper esophageal sphincter function.

Case Report

The patient, aged 52, has suffered from MS for 28 years. Contact with the patient is preserved and is full and logical. No difficulties in initiating and maintaining dialogue are observed; the patient can speak freely, with the content of her speech being factual and adequate to the questions asked. No disturbances in auto- and allopsychic orientation. Psychomotor drive slightly increased. No significant abnormalities in the thought process. The patient's mood is periodically depressed, dominated by a sense of psychophysical insufficiency; she cheers up on contact; emotional dysregulation is observed. The patient also exhibits attention difficulties; these include a lack of concentration and impaired executive attention (alternation, divisibility).

Neurological examination: spastic paresis of the lower limbs, right upper limb ataxia, diplopia when looking in all directions, bilateral Babiński reflex, right side Rossolimo reflex, hypertension, depressive disorder, micturition disorder, fatigue syndrome.

The patient was placed on five-month home speech therapy on 3 November 2022. Meetings were held once a week for 60 minutes. The patient was also given sets of exercises to work on independently. The exercises were introduced gradually to help the patient perform them exactly as instructed by the speech therapist. Over time, the patient was provided with an extensive number of exercises that she knew well and performed correctly.

Cranial nerve examination:

1. Optic nerve (II) — medially restricted visual field in the right eye; left eye normal.
2. Oculomotor nerve (III) — normal palpebral fissure width; the eyes are even and not sunken; the pupils are even. The patient can follow a finger with her eyes in all directions; double vision; upbeat nystagmus.
3. Trigeminal nerve (V) — 50% impaired facial sensation on the right side.
4. Facial nerve (VII) — can extend her tongue with maximum mouth opening; — unable to direct tongue towards nose, — able to direct tongue to chin, — able to direct tongue to right and left

cheek, — imprecisely directs tongue to individual teeth, — voices oral vowels correctly, — Vowel [a] from diaphragm: short and high [a].

a. Assessment of facial nerve function:
   - symmetrical forehead wrinkling,
   - can clench eyes,
   - symmetrical nose wrinkling,
   - can make a "duck face",
   - normal snorting,
   - can press lips symmetrically,
   - can show teeth symmetrically.

b. Oral cavity:
   - correct verticalisation of the tongue,
   - buccal frenum normal,
   - buccal mucous membranes normal,
   - no white tongue,
   - vomiting reflex partially absent,
   - good dental health.

5. Lingual-pharyngeal nerve (IX), vagus nerve (X):
   a. asymmetry of the soft palate (right side raises less) and tongue (right side raises less) is present when voicing the vowel [a],
   b. oral cavity pressure — weakening of suction on the right side,
   c. 3 finger mouth opening (normal),
   d. yawning — asymmetry (right side raises less),
   e. slightly weakened suction of fingers placed on tongue.
6. Accessory nerve (XI):
   a. maximal turning of the head to the side (right and left side) — normal,
   b. maximum lifting of shoulders — normal.
7. Sublingual nerve (XII) — tongue does not deviate when extended forward.

Analysis of the Dysarthria Assessment (OSD) sheet: The patient exhibits incoordination of the speech and respiratory-phonatory apparatus (shortened inspiratory and expiratory phases). In realisation speech, there are disorders of mixed dysarthria (ataxic-spastic), as well as the so-called scanning and explosive speech (irregular symptoms). Decreased verbal fluency. Under the influence of strong emotions, the patient's speech becomes slurred and slowed down. This is then accompanied by prolongation of sounds and inter-word breaks. Her reading is correct as long as exposure is adequate (this is hindered by diplopia). Capable of writing, though not fluently. No aphatic changes are present.

Maximum Phonation Time results obtained in 3 trials were as follows: trial 1: 13 seconds; trial 2: 14 seconds; trial 3: 18 seconds. The average result of the Maximum Phonation Time test with the vowel [a] was 15 seconds. The value obtained is indicative of the patient's respiratory failure.

Analysis of EAT-10 and DYMUS questionnaires
EAT-10 score =16
DYMUS test result =9

Neurogenic dysphagia — poor oral control with leakage of saliva and fluids into the throat before triggering the swallowing reflex. Periodic nasal leakage during drinking due to soft palate dysfunction and velopharyngeal insufficiency. Incidental coughing and choking after swallowing solid foods due to delayed swallowing reflex. Sensation of throat obstruction and pain during swallowing and the need to swallow a bite several times due to soft palate dysfunction and upper esophageal sphincter opening disorders. Paresthesias of the right side of the face — incidental leakage of fluids from the mouth. Swallowing requires compensatory techniques, self-control, postural adaptation and appropriate supportive exercises.

The therapeutic measures for the patient were divided into dysarthria therapy and dysphagia therapy. For both disorders, speech therapy exercises are described in the order in which they were undertaken over the course of the five-month therapy.

In dysarthria therapy, activities started with improving respiratory function. In dysphagia therapy, the priority was to improve soft palate and upper esophageal sphincter function.

Speech therapy for dysarthria:

1. Improving the respiratory system:
   a. breathing exercises in supine position (head aligned with the axis of the body, shoulder blades pulled back):
      - the therapist places a hand on the patient's stomach (roller under the knees). Inhaling through the nose (the therapist's hand rises) and exhaling through the mouth (the therapist's hand falls) in an attempt to lengthen both the inhalation and exhalation phases;
      - taking in air through the nose (abdomen rises), stopping (counting 1-2-3-4 in one's head) and then releasing the air freely (roller under the knees);
      - taking in air through the nose (abdomen rising), then releasing air freely with long phonation of the [sssss] sound (roller under the knees);
      - raising the hands on inhalation, calmly lowering the hands on exhalation (roller under the knees);
      - pulling up and flexing the feet, drawing the head towards the sternum and then lowering the head with the feet pointing;
   b. breathing exercises in sitting position (head aligned with the axis of the body, feet hip-width apart on the floor):

- breathing in through the nose as long as possible, followed by a long exhalation through the mouth;
- raising the arms and inhaling, lowering the arms and exhaling;
- taking in air through the nose (abdomen rising), stopping (counting 1-2-3-4 in one's head) and then releasing air freely;
- taking in air through the nose (abdomen rising) and then releasing air freely with long phonation of the [sssss] sound;
- taking in air through the nose (abdomen rising) and then releasing air in short bursts [s-s-s-s-s-s-s-s-s], up to 3×;
- taking in air through the nose (abdomen rising) and then releasing air in short bursts [s-sh-s-sh-s-sh];
- pronouncing vowels (a, o, e, u) on exhalation;
- holding a piece of paper at such a height that its bottom is at mouth level. Inhaling through the nose and then exhaling through the mouth so that the sheet is deflected;
- blowing a piece of paper off a smooth surface;
- blowing paper scraps off a rough surface (e.g. using a tube);
- blowing out a candle flame;

c. breathing and phonation exercises using a Lax Vox tube:
- blowing through a tube immersed in water to a depth of about 2 cm;
- voicing the vowel [u] through a silicone tube immersed in water;
- changing the pitch on the same vowel [u];
- voicing the [u] vowel through a tube, with a change in the height of its immersion in water;
- attempting to hum a simple melody when voicing the vowel [u].

Rationale: The exercises have improved the patient's breathing quality, increased her lung capacity, facilitated the control of inhalation and exhalation, and improved respiratory-phonatory coordination.

2. Improvement of facial muscles and oral praxis (more repetitions to be performed on the weaker side — in this case, the right side):

a. manual massage of the neuromotor areas of the face [18]:
- "nasal glabellar area — stretching, pressure and vibration in the dorsal-temporal direction with the pad of the index finger;
- outer eye corner areas — stimulation of both points simultaneously, with stretching, pressure and vibration with the tips of the index fingers, in the dorsoventral direction;
- nasal alae area — simultaneous stimulation of both points, with stretching, pressing and vibrating using the index fingers, in the dorsal-lateral-cranial or caudal direction;
- upper lip area — stretching, pressing and vibrating in the dorsal-caudal direction with the inside surface of a slightly bent index finger placed over the entire upper lip area, turning the finger slightly outwards in the final phase;
- lip corner areas — stretching, pressing and vibrating in the dorsal-cranial-medial direction using fingertips;
- chin area — use the index finger placed on the chin to control the closure of the lips. At the same time, use the pad of the thumb to apply pressure and vibration in the dorsocaudal direction;
- mouth floor area — stretching, pressing and vibrating in the dorsal-cranial direction using the thumb and index or middle finger";

b. external massage:
- rub the forehead, from the nasal glabellar area towards the temples;
- rub the cheeks from the nasal alae towards the temples;
- start rubbing from the corners of the mouth and work your way up to the jaw joints, applying slight pressure on the jaw joints at the end;
- rub the chin, moving to the jaw joints as you go;
- massage the lips by stretching with index and middle fingers and then pulling inwards.

Combine the external massage with the massage of the neuromotor zones.

c. massage the inside of the mouth:
- start the massage from the palate with circular movements from the teeth towards the soft palate, going as far as to trigger the pharyngeal reflex;
- massage the tongue starting from the tip of the tongue and moving towards the pharynx as far as to trigger the pharyngeal reflex;
- massage the space under the tongue, causing the tongue to rise;
- massage the cheeks from the inside with slow circular movements;

d. facial muscles exercises:
- wrinkling the forehead;
- raising the eyebrows;
- wrinkling the nose;
- rapid eyelid blinking;

- opening the eyes widely and tightening the eyelids firmly;
- stretching and narrowing the mouth;

Rationale: The improved muscle tone has resulted in better realisation accuracy, increasing the articulatory systems' realisation accuracy and reducing the frequency of vowel lengthening, thereby enhancing articulation and speech tempo. Moreover, the massage has helped the patient to relieve the tension and stress that constantly accompanies her independent living.

3. Maintaining the motor skills of the articulatory organs (lips and tongue):

a. lip exercises:

Group 1 (each exercise to be interspersed with snorting):

- alternate stretching the lips from side to side and making a "duck face";
- make a "duck face" and then move the lips up and down, side to side and make circular movements;
- press the lips together for 10 seconds (on a spatula);
- puff up the cheeks and then release air;

Group 2:

- splutter using the lips;
- alternate stretching and constricting the lips;
- hold a spatula between the lips;
- hold a straw on the upper lip;

Group 3:

- hide the upper lip under the lower lip and vice versa;
- smack with the jaw closed;
- alternate between pulling the lips together as if to voice the vowel [u] and flattening them as for the vowel [i];
- move air from cheek to cheek;

Group 4:

- lift the upper lip to the nose;
- pull in the cheeks;
- puff up the cheeks and slowly let the air out;
- puff up the cheeks and hold the air in for a few seconds;
- alternate between shaping the mouth as if to pronounce the vowels [u] and [i];

Group 5:

- alternate between stretching and pulling the lips;
- bare the teeth and then close the mouth;
- stretch to the right and then to the left, with the mouth open and then closed;
- press a spatula between the lips;

Group 6:

- alternate between making a "duck face" and making a wide smile, with lips joined together;
- make a "duck face" and move the lips right and left;
- alternate between smiling with the right and left side of the lips;
- articulate the following vowels separately, then in pairs, and finally as a sequence: a o i e u y;

b. tongue exercises:

Group 1:

- extend and retract the tongue in a straight line without touching the lips;
- alternate between widening and narrowing the tongue;
- push the cheeks out with the tip of the tongue;
- slide (with a circular motion) the tongue tip under the upper lip and then under the lower lip;
- lift the back of the tongue to the soft palate and then lower it, with the tongue tip placed behind the lower teeth or gums — cat's back;

Group 2:

- extend the tongue against resistance (push a spatula applied to the mouth with the tongue);
- lift the tongue against resistance (with a spatula pressed against the surface of the tongue);
- move the tongue sideways against resistance (with a spatula pressed against the side of the tongue);

Group 3:

- slide (with a circular motion) the tongue under the upper lip and then the lower lip;
- slide the tip of the tongue from the upper teeth along the palate;
- alternate between touching one corner of the lips with the tongue tip and the other;
- widen the tongue and alternate between covering the upper and the lower lip;

Group 4:

- click with the tongue;
- move the tongue and touch all teeth, one after another (with the jaw lowered);
- widen the tongue and extend it out of the mouth without touching the teeth;
- narrow the tongue and extend it out without touching the teeth;

Group 5:

- alternate between moving the tongue from the upper alveolar ridge to the lower alveolar ridge;
- massage the palate with the tongue;
- alternate between widening and narrowing the tongue with the jaw lowered;

Group 6:
- extend and retract the tongue in a straight line without touching the lips;
- massage the tongue with the teeth, squeezing a widened, flattened tongue between the teeth;
- click with the tip of the tongue.

Rationale: A marked improvement in the strength of the orbicularis oris muscle and tongue mobility. Accurate pronunciation of sounds due to an efficient articulation apparatus.

4. Improved phonation and prosody:
   a. **Group 1**:
      - hum by lengthening the mmmmm sound;
      - make a prolonged [m] sound in combination with a vowel: ma, me, mi, mo, mu, my;
      - pronounce extended a, e, o, u, i, y vowels in succession;
      - pronounce speech sounds accurately and fluently. Breathe in at each pause. Take care to pronounce the last vowels clearly. Over time, you can move the point at which you inhale: Siała baba mak [Grandma was sowing poppies] //; Nie wiedziała jak [She didn't know how to] //; A dziad wiedział [Grandpa knew] //; Nie powiedział [But he said nothing] //; A to było tak [And so it went like that];
   b. **Group 2**:
      - on on breath: say the vowels: a, e, o, u, i, y; laugh: ho, hoo, he, ha, hee; multiply: 1×1, 1×2, 1×3…; count: one, two, three, four, …;
      - pronounce speech sounds slowly, accurately and fluently, with vowel lengthening. Take note of punctuation. Take gentle, relaxed breaths: Poem: "Grzeczna dama" [The polite lady] by Małgorzata Strzałkowska;
   c. **Group 3**:
      - hum by lengthening the mmmmm sound. Make a prolonged [m] sound in combination with a vowel: ma, me, mo, mi, mu, my. Follow this by a short [m] but with lengthened vowels;
      - pronounce the combined vowels ou, au and eu with different intonation;
      - utter repetitive phrases of several words on one breath: "Jedna wrona bez ogona, druga wrona bez ogona. […] a ta jedenasta, wrona ogoniasta" [One tailless crow, another tailless crow […] and the eleventh, a tailed one];
      - read a selected text with different intonation: as if reading a fairy tale to young children; as if giving a sermon at a church; as if commenting like a sports analyst. Poem: "Do krytyków" [To the critics] by Julian Tuwim;
   d. **Group 4**:
      - pronounce the following vowels on one breath a, o, e, u, i, y — silently, in a whisper, loudly;
      - "move" vowels from one place to another, as if they were heavy stones;
      - alternate between pronouncing vowels low and high: u a e y i o; e y i o u a; i o u a e y; a e y i o u; o u a e y i; y i o u a e;
      - read a selected text with an appropriate timbre — very fast, then very slow, and then varying the pace of reading according to the content.

Rationale: Voice modulation exercises, combined with phonation training, have made it possible to maintain intelligible speech for longer and have improved communication comfort. Improved pneumo-phono-articulatory coordination, prosody and speech rhythm, better articulator precision, reduced prolongation of sounds, repetition and scanning speech.

Speech therapy for dysphagia:

The patient received information and instruction on compensatory and adaptive techniques indicated for symptoms of swallowing disorder:
- — avoid tilting the head back while drinking,
- — swallow with the chin tilted towards the sternum,
- — use the supraglottic swallowing method based on the following sequence: take in air, swallow a bite/fluid while still holding your breath, cough up,
- — swallow again,
- — when swallowing, you can support yourself by resting your elbows firmly on the table,
- — thicken liquids,
- — drink through a straw,
- — drink from large diameter cups,
- — drink with a spoon,
- — drink in smaller portions,
- — drink fizzy drinks.

1. Improving soft palate and upper esophageal sphincter function
   a. **Group 1**:
      - inhale through the nose and exhale through the mouth, keeping the mouth open at all times;
      - pretend to suck on a candy placed in the back of the tongue;
      - keeping the mouth wide open, place the tip of the tongue behind lower teeth or gums and dynamically articulate the following sounds: k, g, then: ka, ga, ke, ge, ko, go, ku, gu, kę, gę, ką, gą, go og, ug-gu, ok-ko, uk-ku;
      - pronounce logosomes in such a way that the sound [p] is uttered with a strong explosion: om-po, am-pa, em-pe, um-pu, im-pi;

- articulate words starting with the [K] sound: kat, kap, kos, kij, koń, kit, koc, kup, kot, kop, kęs, kąt;

b. **Group 2**:
- yawn, causing the movement of the soft palate;
- use a modified Valsava manoeuvre — making a movement as if to say [k] and holding this position for as long as possible;
- pretend to suck on a candy;
- carry paper balls using a straw;

c. **Group 3**:
- snore while inhaling and exhaling;
- breathe in and hold air in the mouth while biting the tongue with the teeth;
- pronounce words containing velar consonant: kolorowe paski [coloured stripes], park karkonoski [Karkonosze park], plik karteczek [bundle of cards];

d. **Group 4**:
- cough;
- carry out the Masako Manoeuvre: bite the tongue with the teeth and then swallow saliva firmly;
- move flower petals with a straw;

e. **Group 5**:
- inhale air and suck in a light, disposable cup placed on the mouth;
- inhale and hold air in the mouth — in the cheeks;
- blow out air with the tongue down and the mouth wide open;

f. **Group 6**:
- fill the cheeks with air and lightly tap them with fingers;
- pronounce logosomes in such a way that the sound [p] is uttered with a strong explosion: om-po, am-pa, em-pe, um-pu, im-pi;
- use a modified Valsava manoeuvre: the patient pronounces the [K] sound and tries to hold the closure as long as possible.

Rationale: Soft palate and pharyngeal sphincter ring exercises have generally improved oral control. Improved palatal capacity and palatopharyngeal closure has eliminated nasal fluid leakage when drinking. The feeling of an obstruction in the throat when swallowing a bite of solid food is much less frequent.

2. Improved sensory sensitivity and restoration of reflexes (mirror and ice cube stimulation):
   a. thermal stimulation of the palatal arches:
   - using a laryngeal mirror at body temperature, touch duration: 5 seconds;
   - using a laryngeal mirror cooled to ice temperature (–1°C);
   - using a body temperature laryngeal mirror with three gentle movements, touching the frontal arch and moving from the top towards the base;
   - using an ice-temperature laryngeal mirror with three gentle movements, touching the frontal arch and moving from the top towards the base;
   - stimulating the cheek and tongue area with a laryngeal mirror;

   b. thermal stimulation:
   - stimulating the outside of the cheek with an ice cube.

Rationale: Stimulation of the palatal arches has had a positive effect on the regulation of the palatal reflex, which was partially absent. Combined with muscle stimulation of the articulatory organs, thermal stimulation has completely eliminated fluid leakage from the mouth.

3. Lifting the larynx:
   a. manual techniques — laryngeal relaxation exercises (up-and-down stimulation, vibratory lateral movements);
   b. laryngeal taping;
   c. in a sitting position, the patient brings the chin to the sternum, then tries to lift the head while the therapist presses it down;
   d. in a sitting position, the therapist tries to lift the patient's chin, who resists by pressing the head down;
   e. the Shaker Manoeuvre;
   f. lying on the back, the patient holds the head raised for one minute looking at the feet, with a one-minute break afterwards — 3×;
   g. lying on the back, the patient briefly raises the head and lays it back down — 30×;
   h. the Mendelsohn manoeuvre — hold the larynx up for 3 seconds while swallowing, then press the soft palate firmly with the tongue.

Rationale: The patient feels no pain during the passage food bites, which slide more easily into the esophagus.

Discussion

In the literature, we can encounter opinions from researchers questioning the advisability of therapy for speech motor disorders in the course of incurable demyelinating diseases. Exercises focusing on the therapy of dysarthria or dysphagia do not bring about a complete improvement or lasting effects. Should therapy therefore be omitted to avoid exposing the patient to additional effort and stress?

Referring to Jolanta Panasiuk's synthetic approach, speech is a derivative of the action of three mechanisms

— biological, psychological and social — and the patient's motivation and emotional attitude to the therapy process must therefore be considered. The therapist's task is to ensure that the patient functions independently for as long as possible, retaining primary functions and the ability to communicate. This is only possible by building a good patient-therapist relationship, which will motivate the patient to consciously participate in the therapeutic process, thereby bringing the best possible results [19].

Olga Jauer-Niworowska, author of many publications on working with patients with dysarthria, also expresses her firm belief that the patient's conscious cooperation is a factor determining the effectiveness of therapy. She believes that verbal motor functions depend on biological and psychological mechanisms. Therefore, properly conducted therapy takes into account both the patient's abilities and subjective feelings [20].

The post-therapy EAT-10 test score was 12 (four points lower). The severity of some of the abnormal symptoms associated with eating decreased. The patient reported that food stuck in her throat less frequently, swallowing became less painful and required less effort, and dysphagia hardly took away her joy of eating. As a result of therapy, there has been an improvement in mouth and cheek muscle tone, oral movements and tactile and thermal sensation. The patient's oral control improved, resulting in the absence of oral fluid leakage. The therapy has also improved the pharyngeal and swallowing reflex. No leakage into the nasal cavity is observed during fluid consumption. Although the result of the second DYMUS test used to diagnose early signs of dysphagia did not change after therapy, it should be noted that the patient's education about swallowing disorders allowed her to objectively assess her degree of dysphagia. The patient believes that her condition has improved significantly, but the problems have not disappeared entirely and constant work is needed to maintain the effects of therapy for as long as possible. The improvement in dysphagia has brought about a significant change in the patient's behaviour. The patient feels less stress when swallowing fluids, which consequently improves her psychophysical performance. The knowledge and skills acquired to manage swallowing disorders have enabled the patient to restore, as far as possible, the physiological conditions of swallowing.

During a repeat breathing test, the average phonation time in three attempts was close to the lower limit of normal at 19 seconds (4 seconds more). There has been a lengthening of the inspiratory and expiratory phases and phonation time, as well as an improvement in the coordination of the speech and breathing apparatus. With work on melody and accent, an improvement in prosody has been noted as well. During longer utterances, the patient has learned to use gestures for support, which has also affected her verbal fluency. It was vital for the patient to improve the precision of articulatory movements to reduce the prolongation of sounds, repetitions and scanning speech, which made her speech entirely unintelligible in stressful situations, resulting in even greater frustration for the patient.

Educating the patient, as already mentioned, has had a great impact on the quality of progress in speech therapy. The knowledge of the disease mechanisms (identifying with them), as well as their possible consequences, was a stimulus for the patient to work harder, resulting in an increasing involvement in the therapeutic process. The patient acknowledged that she sometimes repressed or did not notice her speech and swallowing issues (as reflected in the medical records). The patient consistently worked on her own, emphasising the positive impact of the therapy on her condition.

People with multiple sclerosis require care by multiple specialists. A speech therapist plays an important role in rehabilitation management. Speech therapy is multi-faceted and requires the patient to be constantly observed and the objectives to be adjusted accordingly. The therapy is personalised, tailored to the patient's abilities and needs. Speech therapy should focus on the maintenance by the patient of primary functions and communication. Early recognition of dysarthria and dysphagia in multiple sclerosis enables the implementation of therapeutic measures to prevent their further consequences.

Multiple sclerosis is a chronic, incurable disease that systematically leads to deterioration of the patient's neurological condition. Nutritional therapy should be undertaken if there is a high risk of aspiration or if malnutrition is diagnosed.

Conscious cooperation with a patient with dysarthria, in which one gradually progresses from passive exercises to assisted exercises to active exercises of the articulatory apparatus and the implementation of linguistic material, enables the formation of cortical-subcortical connections between the structures involved in the execution of verbal movements. This approach offers new insights into the therapy of people with dysarthria [20,21].

Conclusions

1. The therapeutic intervention should be planned and implemented according to the individual abilities and needs of the patient.
2. The patient's condition has improved significantly, but problems have not subsided 100% and continuous work is required to maintain the effects of therapy for as long as possible.
3. The improvement in dysphagia has brought about a significant change in the patient's behaviour. She experiences less stress when swallowing fluids,

which consequently improves her psychophysical performance.

4. The knowledge and skills acquired to manage swallowing disorders and dysarthria have enabled the patient to restore, as far as possible, the physiological conditions of swallowing and word formation.
5. Early recognition of dysphagia and dysarthria in multiple sclerosis enables the implementation of therapy to improve primary functions and articulation of sounds, which not only affects the patients' quality of life, but also minimises the risk of disorder-related complications.
6. However, the patient's conscious participation and independent, systematic work should not be forgotten in speech therapy treatment.

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