EFFECTIVENESS OF APPLICATION OF REHABILITATION MEASURES IN PATIENTS WITH RESIDUAL MANIFESTATIONS OF FACIAL NERVE NEUROPATHY IN THE LONG-TERN RECOVERY PERIOD

ÚČINNOSŤ APLIKÁCIE REHABILITAČNÝCH OPATRENÍ U PACIENTOV S REZIDUÁLNYMI PREJAVMI NEUROPATIE TVÁROVÉHO NERVU V OBDOBÍ DLHODOBEJ REKONVALESCENCIE

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ABSTRACT

Background: A topical issue in neurology is facial nerve neuropathy, which is due to the high prevalence of the disease and its consequences, which significantly reduce the quality of life of patients.

Objective: To evaluate the effectiveness of the developed algorithm of rehabilitation measures in patients with residual phenomena of facial nerve neuropathy in the long-term recovery period.

Sample: The study involved 63 people with facial neuropathy who were undergoing rehabilitation courses at the Crystal Touch Bell's Palsy clinic, Rotterdam, The Netherlands (2017 – 2019).

Methods: analysis, synthesis, and generalization of scientific and methodological literature data, clinical neurological and rehabilitation examination: medical history taking, Synkinesis assessment questionnaire, FaCE scale.

Results: According to the results of the initial examination, it was found that 60.3 % of patients had eyelid-lip pathological synkinesia, 53.9 % of patients had eyelid-frontal pathological synkinesia. The FaCE scale Instrument found that most patients (96.8 %) felt tension, fatigue, and discomfort in some areas of the face; difficulty in moving food in the mouth was indicated by 65.1 % of patients. An algorithm of rehabilitation measures in the main group was developed and implemented, which contributed to the improvement of the neurological state of patients, the reduction of complaints and pathological synkinesis, the restoration of the motor function of the facial muscles, and the psycho-emotional state of patients. Re-examination revealed that in the main group the number of patients with eyelid-lip synkinesia decreased to 28.1 %, in the control group such pathological movement was observed in a larger number of patients – 38.7 %. The psycho-emotional state of patients improved: 53.1 % of people in the main group noted that they feel more confident in society, in 48.4 % of patients in the control group the behavior did not change significantly.

Conclusions: The results of the comparative analysis of the dynamics of indicators by Synkinesis assessment questionnaire and FaCE scale proved the effectiveness of the developed algorithm of rehabilitation measures in patients of the main group, compared with the control group.

Keywords: Physical Therapy. Rehabilitation. Facial nerve. Synkinesia. Patients.

ABSTRAKT

Východiská: Aktuálnou otázkou neurológie je neuropatia tvárového nervu aj z dôvodu vysokej prevalencie choroby a jej dôsledkom, ktoré veľmi znižujú kvalitu života pacientov.

Cieľ: Ohodnotiť účinnosť aplikácie rehabilitačných opatrení u pacientov s reziduálnymi prejavmi neuropatie tvárového nervu v období dlhodobej rekonvalescencie.

Súbor: Štúdie sa zúčastnilo 63 ľudí s neuropatiou tvárového nervu, ktorí absolvovali rehabilitačný kurz na klinike Crystal Touch Bell's Palsy Clinic, Rotterdam, Netherlands (2017 – 2019).

Metódy: Analýza, syntéza a zovšeobecnenie údajov vedeckej a metodickej literatúry, klinicko-neurologické a rehabilitačné vyšetrenie: zber anamnézy, stupnica dotazníka na hodnotenie synkinézy, stupnica FaCE scale.

Výsledky: Podľa výsledkov vstupného vyšetrenia sa zistilo, že 60,3 % pacientov malo patologickú synkinézu viečka – pery, 53,9 % pacientov patologickú synkinézu čelného viečka. Podľa FaCE scale sa zistilo, že väčšina pacientov (96,8 %) pociťovala napätie, únavu a nepohodlie v niektorých oblastiach tváre; ťažkosti s pohybom potravy v ústach uviedlo 65,1 % pacientov. Vyvinutý a implementovaný algoritmus rehabilitačných opatrení v hlavnej skupine prispel k zlepšeniu neurologického stavu pacientov, zníženiu sťažností a patologickej synkinézy, obnoveniu motorických funkcií tvárových svalov a psycho-emocionálnemu stavu pacientov. Pri opätovnom vyšetrení sa zistilo, že v hlavnej skupine klesol počet pacientov so synkinézou očných viečok na 28,1 %, v kontrolnej skupine bol takýto patologický pohyb pozorovaný u väčšieho podielu pacientov – 38,7 %. Psycho-emocionálny stav pacientov sa zlepšil: 53,1 % ľudí v hlavnej skupine uviedlo, že sa v spoločnosti cítia istejšie, u 48,4 % pacientov v kontrolnej skupine sa správanie výrazne nezmenilo.

Záver: Výsledky komparatívnej analýzy dynamiky dotazníka na hodnotenie synkinézy a nástroja FaCE scale preukázali účinnosť vyvinutého algoritmu rehabilitačných opatrení u pacientov hlavnej skupiny v porovnaní s kontrolnou skupinou.

Kľúčové slová: Fyzická terapia. Rehabilitácia. Tvárový nerv. Synkinéza. Pacienti

INTRODUCTION

Nervous system diseases are currently a significant medical and social problem (Bektemirova,

2015; Bismak, 2017; Dereka, 2020). The topical issue of neurology is neuropathy of the facial nerve, due to the high prevalence of the disease, the peculiarities of the clinical course, and its consequences, which significantly reduce the quality of life and negatively affect the psycho-emotional sphere of patients (Leiderman et al., 2013; Garcia et al., 2015). It is reported that the prevalence of facial nerve neuropathy is 13 – 24 cases per 100 thousand population (Ladnaya, 2015). Facial nerve damage leads to persistent aesthetic defects, which manifests itself primarily in the form of facial asymmetry and the presence of synkinesis (Svistushkin et al., 2016; Spencer et al., 2016). The complexity and duration of the process of restoring the functional activity of facial muscles is the main reason for the disability and social maladaptation of this group of patients.

The analysis of modern studies shows that the effectiveness has not yet been studied and the expediency of using rehabilitation measures in the long-term recovery period has not been determined, there is no consensus on the algorithm of rehabilitation measures in patients with residual effects of facial nerve neuropathy based on the use of proprioceptive methods of rehabilitation and a comparative assessment of the dynamics of indicators characterizing the functional state of facial muscles in the long-term recovery period. All the above determines the relevance of the chosen research topic.

OBJECTIVE

To evaluate the effectiveness of the developed algorithm of rehabilitation measures in patients with residual phenomena of facial nerve neuropathy in the long-term recovery period.

SAMPLE

The study involved 63 patients with residual facial nerve neuropathy who underwent rehabilitation at the Crystal Touch Bell's Palsy clinic, Rotterdam, The Netherlands (2017 – 2019). Patients were randomly divided into 2 groups: the main group (32 people) and the control group (31 patients). Among patients, there was a prevalence of females – 77.8 %, men – 22.2 %. The defeat of the facial nerve on the right was observed in 74.6 % of patients, on the left – in 25.4 % of patients. The duration of the disease ranged from 9 months to 20 years. The age of the surveyed varied from 18 to 60 years, on average 47.8 ± 8.3 years, which indicated the presence of the disease in patients of the most efficient age.

METHOD

To assess and summarize the initial and repeated indicators, the patients were examined before the use of physical therapy (initial examination) and 6 months after the implementation of the algorithm of rehabilitation measures (re-examination). During the study, methods of analysis, synthesis, and generalization of scientific and methodological literature data, clinical and neurological examination were used: conducted a thorough collection of medical history, including a wide range of complaints and features of the disease, Synkinesis assessment questionnaire, FaCE scale, rehabilitation survey (Kahn et al., 2009; Murakami, 2012).

Research design

An algorithm of rehabilitation measures in the long-term recovery period was developed and implemented for the patients of the main group based on the rehabilitation examination. At the level of structure and function according to ICF, we used the following means of physical therapy: kinesitherapy (therapeutic exercises for the mimic and masticatory muscles of the face in front of a mirror, breathing exercises), neuromuscular retraining, massage, self-massage, taping. At the level of activity and participation: kinesitherapy with neuromuscular activation (exercises in simulating the expression of various emotions on the face in accordance with the social context in front of a mirror), sound gymnastics. In the control group, standard rehabilitation measures were used - physical exercises for mimic and masticatory muscles, therapeutic massage according to the method of Makarov (2006), hardware physiotherapy procedures.

Statistical analysis

For statistical processing of data, we used the licensed program Microsoft Excel (2013). Statistical analysis of the received results was conducted, considering recommendations on the Microsoft Excel tables usage for computer data analysis. Assessment of statistical hypothesizes based on 5 % significance level.

RESULTS

The rehabilitation examination was carried out according to the developed scheme using the ques-

tionnaire method. When familiarizing with the anamnesis of the disease, special attention was paid to the causes of the disease. Thus, it was found that the most common was idiopathic facial nerve neuropathy (Bell's palsy) – 34.9 % of patients, surgical removal of the tumor was the cause in 17.5 % of cases, herpes virus – in 12.7 % of patients.

According to the survey results, in the acute period, patients were prescribed drug treatment (prednisone, antiviral drugs, and antibiotics), acupuncture, and laser therapy. Among the means of physical therapy – mimic gymnastics and massage.

As a result of treatment and rehabilitation, the first signs of recovery appeared in 36.5 % of people after 4 weeks, in 39.7 % of patients – after 6 – 8 weeks, in 23.8 % of patients – after 12 weeks. Despite the ongoing treatment, 34.9 % of patients showed a slowdown in the recovery process after 3 – 4 months. At the initial examination, hyperacusis was observed in 20.6 % of patients, in 52.4 % of patients - excessive tearing during eating, talking, or being in the open air, 17.5 % of patients complained of pain when touching the face, headaches – 26.9 % of persons.

The Synkinesis assessment questionnaire was used to identify synkinesis. The initial examination revealed that 60.3 % of patients had eyelid-lip pathological synkinesia (when closing the eye, moving the corner of the mouth), 42.9 % of people complained of closing the eye on the affected side of the face when talking, 53.9 % of patients it was observed eyelid-frontal pathological synkinesia. Also, in 52.3 % of patients there, were motor-vegetative pathological synkinesias in the form of a symptom of "crocodile tears" (tears in the eye when eating) (Tab. 1).

The FaCE scale was used for a detailed analysis of movement disorders of the facial muscles and social activity of patients with facial nerve neuropathy. According to the initial examination, 93.7 % of patients found it difficult to perform movements of the facial muscles on one side, 6.3 % – on both sides of the face. 19.0 % of patients noted that the corner of their mouth goes up when they smile, 14.3 % of people were able to raise their eyebrows, 17.5 % of respondents felt the movement of the mouth on the affected side when stretching their lips.

Part II of the questionnaire clarified the condition of the facial muscles on the affected side, whether the eye was injured, and the difficulties that patients face when eating and communicating with people. It was found that most patients (96.8 %) felt tight, worn out, discomfort in some areas of the face; dryness, irritation, itching in the eye on the affected side – 85.7 % of people, used eye drops or ointment on the affected side – 44.4 % of patients. Difficulties in moving food around the mouth during eating were noted by 65.1 % of patients; with drooling, keeping food or drink in my mouth (off my chin and clothes) – 42.9 % of people (Tab. 2).

All the above negatively affected the psychoemotional state of patients, they indicated changes in relationships with others, felt discomfort in communication. 92.1 % of patients noted that their behavior in public changed due to facial problems, half of the patients (50.8 %) felt that people treated them differently because of facial problems (Tab. 2).

The results of the survey on part III indicated some self-isolation of patients due to damage to facial muscle, as 74.6 % of people decreased the desire to participate in public events or to see friends

Table 1 Distribution of patients according to the results of the assessment on the scale of synkinesis at the initial examination

Symptoms	Number of patients, n = 63 [%]
When I smile, my eye closes	33.3
When I speak, my eye closes	42.9
When I whistle or pucker my lips, my eye closes	46.0
When I smile, my neck tightens	38.1
When I close my eyes, my face gets tight	53.9
When I close my eyes, the corner of my mouth moves	60.3
When I close my eyes, my neck tightens	44.4
When I eat, my eye waters	52.3
When I move my face, my chin develops a dimpled area	41.3

Table 2 Distribution of patients according to the results of the assessment on the FaCE scale (part II) at the initial examination

Symptoms	Number of patients, n = 63 [%]
Parts of my face feel tight, worn out, or uncomfortable	96.8
My affected eye feels dry, irritated, or scratchy	85.7
When I move my face, I feel tension, pain, or spasm	93.7
I use eye drops or ointment in my affected eye	44.4
My affected eye is wet or has tears in it	46.0
I act differently around people because of my face (facial problem)	92.1
People treat me differently because of my face (facial problem)	50.8
I have problems moving food around in my mouth	65.1
I have problems with drooling, or keeping food or drink in my mouth (off my chin and clothes)	42.9

and relatives, 58.7 % of patients limited their visits to restaurants due to difficulties with eating.

Thus, according to the results of the initial examination, the presence of neurological symp-toms in all patients was established: pathological synkinesias of various types, facial muscle dysfunction on the affected side of the face, difficulty with eating, impaired psychoemotional state and decreased social activity of patients due to problems with the face.

We performed a re-examination after 6 months, during which we used the algorithm of physical therapy developed by us. When conducting a re-survey, we found a decrease in patient complaints in both the main group (MG) and the control group (CG).In the MG, the number of patients who had hyperacusis on the affected side decreased – 9.4 %, tearing when eating, talking, or being outdoors remained in 21.9 % of people, facial pain when touched and headache complained less half of patients in MG: 6.3 % and 12.5 %, respectively. In the CG, less pronounced changes in the symptoms of facial nerve neuropathy were observed: 12.9 % of persons continued to complain of hyperacusis, tearing – 29.0 % of patients, facial pain when touched, and headache – 9.7 % and 16.1 % of patients.

Analyzing the severity of pathological synkinesias, we noted a decrease in the manifestations of synkinesias and the number of patients with this disorder in both groups. Thus, in the MG during the re-examination, the number of patients with eyelid-lip synkinesia decreased to 28.1 % of persons, in the CG such pathological movement was observed in a larger number of patients – 38.7 %, closing the eye on the affected side of the face during a conversation was noted in 25.0 % of persons in the MG, in CG of such patients was 7.3 % more, the eyelid-frontal pathological synkinesis also remained in 25.0 % in the MG, n CG of such patients was slightly more – 29.0 %. Eyes tear when eating in 18.8% of patients in MG and 22.6 % of patients in CG (Tab. 3).

The use of neuromuscular relaxation exercises in the MG helped to improve the functional state of the muscles on the affected side of the face: according to the results of the FaCE scale Instrument (Part I), during the re-examination, most patients showed movements of the angle of the mouth when smiling and stretching their lips, patients were able to raise an eyebrow. There were significantly fewer such patients in the CG.

A decrease in the manifestations of the disease and restoration of movements on the affected side of the face was indicated by the results of Part II of the indicated scale. Patients of the MG noted an improvement in the condition of the eye on the affected side: dryness and irritation remained in 34.4 % of people, 25.0 % of patients continued to use eye drops or ointment on the affected side, difficulties with moving food in the mouth were noted by 28.1 % of persons, difficulties with food and fluids in the mouth (gets on the chin and clothes) – 18.8 % of patients in the MG.

In the CG, after the rehabilitation course, positive changes in the motor function of the muscles of the face were also observed, but in a smaller number of patients, compared with the MG: dryness and eye irritation from the side of the lesion remained in 45.2 % of people, which is 10.8 % more than in MG. Difficulties with moving food in the mouth complained of 35.5 % of people, with food and liquids in the mouth (gets on the chin and clothes) – 22.6 % of patients in the CG. Attention is drawn to the fact that the attitude of patients towards themselves in

Table 3 Distribution of patients according to the results of the assessment on the FaCE scale (part I) during the re-examination

Symptoms	Main group n = 32		Control group n = 31	
	Before rehab. [%]	After rehab. [%]	Before rehab. [%]	After rehab. [%]
When I smile, my eye closes	34.4	15.6	32.3	22.6
When I speak, my eye closes	43.8	25.0	41.9	32.3
When I whistle or pucker my lips, my eye closes	46.9	18.8	45.2	25.8
When I smile, my neck tightens	34.4	21.9	38.7	29.0
When I close my eyes, my face gets tight	56.3	25.0	54.8	29.0
When I close my eyes, the corner of my mouth moves	59.4	28.1	58.1	38.7
When I close my eyes, my neck tightens	46.9	18.8	45.2	25.8
When I eat, my eye waters	53.1	18.8	51.6	22.6
When I move my face, my chin develops a dimpled area	46.9	21.9	45.2	25.8

both groups has changed after the course of rehabilitation: 53.1 % of persons in the MG noted that they feel more confident in society; the absence of improvement was indicated by 37.5 % of patients. In 48.4 % of patients in the CG, the behavior did not change significantly.

It should be noted that the improvement in the functional state of the facial muscles helped to improve the psycho-emotional state of patients, the desire to communicate with friends, visit public cities, and more. So, in the MG, most patients noted that their appearance has ceased to affect their interest in meeting friends and relatives, participating in social events, but 28.1 % of patients still need to work in this direction. In the CG, 38.7 % of persons indicated that it is still difficult for them to feel confident when communicating with friends and relatives, which is 10.6 % more than in the MG.

Thus, the developed and implemented algorithm of rehabilitation measures in MG helped to improve the neurological state of patients, reduce complaints and pathological synkinesis, and restore the motor function of facial muscles and the psycho-emotional state of patients.

DISCUSSIONS

According to various sources, the pathology of the facial nerve is annually registered in 2 – 3 people out of 10 thousand populations (Artyushkevich et al., 2015; Leiderman et al., 2013; Orlova et al., 2011). The facial nerve controls muscle movements in the facial area. This allows a person to smile, express emotions, cry, wink, and so on. Facial neuropathy can lead to severe physical limitations, which negatively affect the psychological state of patients and reduce the quality of life. Although in most cases the manifestations of the disease gradually disappear, but this requires a long time to apply rehabilitation measures (Akulov et al., 2016; Burnusus, Karpov, 2013).

Particular attention should be paid to the long-term period of the disease when there are no acute neurological symptoms, but the consequences of the disease continue to bother the patients. Our studies confirmed the data on the presence of disorders of the motor function of the facial muscles of the face on the affected side in the long-term period: muscle paresis, facial asymmetry, and pathological synkinesis. There are problems with eating, patients find it difficult to talk, communicate with family, friends, tearing is observed (Markin, 2017; Orlova et al., 2011).

In the works of Bismak (2017) noted that in the treatment and rehabilitation of patients with neuropathy of the facial nerve, it is necessary to use a comprehensive approach with the obligatory inclusion of physical therapy means. In addition, the application of the main provisions of the ICF in the rehabilitation process of patients with this pathology is relevant. According to Bektemirova (2016); Barulin et al., (2017) with neuropathy of the facial nerve, it is advisable to use, along with drug treatment, kinesiotherapy, massage, hardware physiotherapy procedures, kinesiotaping, and other measures. According to Ladnay (2015) to reduce neurological deficits, the use of acupuncture in combination with reflexology and myogymnastics is effective.

Our research has supplemented the data of Akulov et al., (2016); Martin (2015) on the positive ef-

fect of physical therapy on the functional state of facial muscles, reduction of synkinesis, facial asymmetry.

CONCLUSIONS

An analysis of the literature and our experience shows that rehabilitation measures play an important role in the treatment of facial nerve neuropathy, especially in the long-term period. Physical therapy is aimed at restoring the motor activity of the facial muscles on the affected side and prevention or alleviating consequences, such as synkinesis and spasms. It is established that during the initial examination according to the synkinesis scale, various types of pathological synkinesis were revealed in patients. The FaCE scale showed muscle tension in the face, neck, pain, tearing, eating and speech disorders, and other clinical manifestations.

The results of a comparative analysis of the dynamics of indicators on the synkinesis scale and the FaCE scale proved the effectiveness of the developed algorithm as part of a rational treatment and rehabilitation complex in patients of the main group in comparison with the data of the control group. In the MG, re-examination revealed a decrease in the number of patients with eyelid-lip synkinesis to 28.1 % of persons, in the CG such pathological movement was observed in a larger number of patients – 38.7 %, closing the eye on the affected side of the face during a conversation was noted in 25.0 % of persons in the MG, in the CG of such patients was 7.3 % more, the eyelid-frontal pathological synkinesis also remained in 25.0 % in the MG, in the CG there were slightly more such patients - 29.0 %. Thus, the developed algorithm of rehabilitation measures for neuropathy of the facial nerve can be recommended for use in therapeutic and rehabilitation measures.

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