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THE EFFICIENCY OF PHYSICAL THERAPY IN A CHILD WITH FACIAL PARESIS

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***Abstract**: Paralysis is a disorder of the voluntary motor activity that can occur in quantitative terms by reducing the force, amplitude and speed parameters of the movement. The prognosis in facial paralysis is generally good, with 85% of patients experiencing improvement three weeks after the onset of the disease. The present paper aims to demonstrate that early intervention through physical therapy will prevent the sequelae from being installed in a child with facial paresis, and at the same time will facilitate the condition of the subject throughout the therapeutic intervention. For evaluation, we used the House-Brackmann Scale, the Sunnybrook Scale, muscle tone testing, tactile, thermal, and pain sensitivity. The results obtained demonstrate the effectiveness of physical therapy in a child with facial paresis, the applied intervention program succeeding to combat the facial asymmetries, to restore muscle tone and to recover all forms of lost sensitivity.*

Key words: *paresis, facial nerve, child.*

1. Introduction

The facial nerve is a mixed nerve that provides motor, sensory and vegetative innervation for the facial muscles and for the tear-mucous-nasal glands.

Paralysis is a disorder of the voluntary motor activity, which can occur in quantitative terms by reducing the parameters of force, amplitude and speed of movement [8 p.11].

The congenital facial paralysis is a rare form of paralysis and affects approximately 1.8% of newborns. This may be manifested unilaterally or bilaterally, may be complete or incomplete, traumatic or acquired. If congenital facial paralysis does not intervene early, in time, it can impair a child's verbal and emotional expression.

The annual incidence of facial paralysis is approximately 20 cases out of 100,000 people, and 85% of the patients are cured without any treatment [5].

Beursken (2006) studied the role of mimics and massage exercises on facial asymmetries and synkineses. The results obtained showed a 20% decrease in symptoms, according to the Sunnybook assessment scale [2].

In 2015, Wang L. studied the effectiveness of acupuncture and vitamin

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B12 on two groups of subjects. One group was given a treatment schedule based only on acupuncture, while the control group was treated with an acupuncture-based schedule and vitamin B12 injections. The results showed a recovery of 62-57% in the group where acupuncture and vitamin B12 were used, whereas in subjects who only used acupuncture, the recovery rate was 44-50% [10].

Because it is a complex condition in the facial paresis, the therapeutic intervention should be based on a specific activity aiming at the complete recovery of the neuromotor lost functions [9 p.35].

2. Objectives, Purpose and Hypotheses of Research

In close connection with the working hypotheses, the aim of the present paper is to analyse and present the results obtained after applying a physical therapy program to a child with facial paresis.

In order to achieve the proposed goal, we have pursued the following *objectives* throughout the research:

– Consultation of the specialized literature to obtain a clear and objective image of facial paresis, as well as the intervention methods for its recovery;
– Conducting an experimental research in which we will pursue the development and implementation of an applied intervention based on physical therapy methods, techniques and procedures, demonstrating the importance of physical therapy in the recovery of a child's facial nerve paralysis.

The research hypothesis was as follows: *it is assumed that an early application of a physical therapy program to a child with facial paresis will lead to the correction of the muscle imbalances and to the control of the sensory disorders resulting from the damage of a facial nerve.*

3. Material and Methods

The research methods used during the intervention were the following: the theoretical documentation method, the pedagogical observation method, the survey method, the case study method, the method of data processing and graphic representation, the specific exploration methods and evaluation methods.

The subject of the research was a 6-year-old girl (C.B), diagnosed with "a frigore" facial paresis at the level of the left hemiface. The recovery started 2 weeks after the paresis occurred and after the drug treatment finished.

The research location was the laboratory for sensory stimulation in the physical therapy recovery base of "Vasile Alescandri" University of Bacau, and the therapeutic intervention had 1-month duration.

We used the modified Sunnybrook Scale, the House – Brackmann Scale, the Freyss Scale, the tactile, thermal and pain sensitivity and the anthropometric measurements.

The modified Sunnybrook scale. It was developed by Ross et al. in 1996 and is a scale that evaluates the severity degree of the facial nerve affection in 3 phases [6].

In the first stage, the symmetry of the eye, cheek and mouth was evaluated at rest. Each element was assigned a score between 0 and 2, and their sum was multiplied by 5.

The next step is related to the evaluation of 5 facial expressions whose

score was calculated with points from 1 to 5 (1 = no movement, 2 = slight movements, 3 = slight range of the movement, 4 = almost complete movements, 5 = complete movements). All the values obtained were gathered and then multiplied by 5.

The third step was to determine the severity degree of synkineses on a scale of 1-4 (1 = non-synkineses, 2 = moderate synkineses, 3 = moderate synkineses, 4 = severe synkineses).

The House- Brackmann Scale - helps to determine the degree of paresis. Depending on the severity of the condition, a mark was assigned to the subject on a scale of 1 to 4. (1 = no paresis, 2 = mild paresis, 3 = moderate paresis, 4 = severe paresis).

The types of sensitivity evaluated were: tactile, thermal and pain.

Tactile sensitivity was tested with a brush, the thermal one by using a warm (hot and cold) thermal gel, and the pain by some very fine pinching. The areas under evaluation were the chin, the lips, the nose, the cheek, the auricular area and the forehead. The assessments were made bilaterally by comparing the healthy part with the affected one. To evaluate sensitivity we used the following quotation: 0 - no sensitivity, 1 - minimal sensitivity, 2 - poor sensitivity, 3 - normal sensitivity.

The muscle tone and motor activity were tested by using the Freyss Scale. It tracks the contractile activity of 10 muscle groups, which the patient has to contract separately. Depending on the muscular activity recorded, the quotation was as follows: 0 - no contraction, 1 - minimal contraction, 2 - weak contraction, 3 - normal contraction.

The muscle tone was appreciated on a scale of -3 to 0, where 0 is the normal tonus, -1 average tonus, -2 low tonus and -3 absent tonus.

Along with all these methods of assessment, we also made anthropometric measurements of the face where we checked: the distance between the eyebrows and eyes, the distance between the zigzag bone and the lip prick, and the distance between the nasal fossa and the lip.

In the first 2 weeks, the physical therapy sessions were done every day, and then, as the condition of the subject improved, the frequency of sessions was reduced to 2 or 3 per week. The length of a session was about 45 minutes. Each exercise was done in 2 sets of 10 repetitions, but these values varied, depending on the child's ability to follow the physical therapist.

In the first phase of the physical therapy program (flaccid phase), the intervention consisted in applying passive mobilizations, stretch reflexes, and stimulating massage.

As the subject regained its motor innervation, we began to apply passive-active, active-strength techniques as well as PNF (SI, SOI and AIS) techniques.

The mimic exercises attempted to reproduce the usual expressions of the face and consisted of: eyebrow lifting exercises, nostril expansion, eye closure and opening, etc.

The effort made by the therapist to achieve the right results in the neuromotor recovery process was also supported by the child's participation in the sense that he had the capacity to understand the content of the system of means she was acting with. In this regard, in order to keep the child's attention throughout the recovery program, the

exercises were made under the form of a game, progressively and with a resistance adapted to the subject's capabilities.

4. Results and Discussions

Table 1

The results obtained according to the Sunnybrook Evaluation Scale

Evaluation of symmetry at rest (maximum possible score 15)						
	Eyes	*Cheek*	*Mouth*			
I.T.	0	1	1			Total =I.T.. * 5 = 10
F.T.	0	0	0			Total = F.T.. *5 = 0
Symmetry of the voluntary movement (maximum possible score 100)						
	Lifting eyes	*Closing eyes slowly*	*Smiling*	*Wrinkling the nose*	*Tightening lips*	
I.T.	2	3	3	2	3	Total I.T.. * 4=52
F.T.	4	4	5	5	5	Total F.T.. * 4= 92
Evaluation of synkineses (maximum possible score 20)						
	Lifting eyes	*Closing eyes slowly*	*Smiling*	*Wrinkling the nose*	*Tightening lips*	
I.T.	0	1	0	1	0	Total I.T..= 2
F.T.	0	0	0	0	0	Total F.T..= 0

Legend: **I.T. =** Initial testing, F.T. = Final testing

Table 2

The results of the tactile, thermal and pain sensitivity

Tactile sensitivity						
	Chin	*Lips*	*Nose*	*Cheek*	*Temporo-mandibular area*	*Forehead*
I.T.	1	2	3	2	2	1
F.T.	3	3	3	3	3	3
Thermal sensitivity						
	Chin	*Lips*	*Nose*	*Cheek*	*Temporo-mandibular area*	*Forehead*
I.T.	2	2	3	1	2	2
F.T.	3	3	3	3	3	3
Pain sensitivity						
	Chin	*Lips*	*Nose*	*Cheek*	*Temporo-mandibular area*	*Forehead*
I.T.	2	2	2	2	3	3
F.T.	3	3	3	3	3	3

Legend: I.T. = Initial testing, F.T. = Final testing

Table 3

Results of motor activity and muscle tone evaluation

	Evaluation of motor activity		**Evaluation of muscle tone**	
	I.T.	**F.T.**	**I.T.**	Final testing
Frontalis	2	3	-2	0
Corrugator	2	3	-1	0
Zygomaticus	2	3	-2	0
Buccaneer	2	3	-2	0
Nassalis	2	3	-1	0
Pyramidal	1	3	-1	0
Lip orbicular	2	3	-2	-1
Eyelid orbicular	1	3	-2	-1
Risorius	1	3	-1	0
Mentalis	2	3	-1	0

Legend: **I.T. = Initial testing, F.T. = Final testing**

Table 4

The results obtained according to the House-Brackmann evaluation scale

Evaluation of the paresis degree	
I.T.	**3**
F.T.	**1**

Legend: I.T. = Initial testing, F.T. = Final testing

Table 5

Results of the anthropometric measurements of the face

Measuring the distance between eyebrows and eyes (in cm.)		
	Left hemiface	*Right hemiface*
I.T.	4	3
F.T.	3	3
Measuring the distance between the zygomatic bone and the lip prick (in cm.)		
	Left hemiface	*Right hemiface*
I.T.	4	2.5
F.T.	2.5	2.5
Measuring the distance between the nasal fossa and the lip prick (in cm.)		
	Left hemiface	*Right hemiface*
I.T.	3.5	1.5
F.T.	2.5	1.5

Legend: **I**.T. = Initial testing, F.T. = Final testing

The results obtained by subject C.B were grouped and are presented in Tables no. 1, 2, 3, 4 and 5. From the analysis of the data presented in the above-mentioned tables, we highlighted the most important aspects.

Following the evolution of the Sunnybrook Scale (Table 1), at the initial evaluation of the symmetry at rest, we can notice a difference of 1 point at the cheek (1) and mouth (1) levels. At the final evaluation, this difference disappeared, both cheek and mouth getting 0 points. From a total of 15 possible points, at the initial evaluation, our subject obtained 10 points, and after the therapeutic program, the symmetry at rest showed normal values (0)

By comparing the symmetry of the voluntary movements with the maximum value that can be recorded (5), we found that in the initial evaluation the lifting of the eye (2) and the wrinkling movement (2) were difficult and the slowly-closing movements of the eye 3), the smile (3) and lip tightening (3) were incomplete. In the final testing, all values returned to normal, the subject having a minor deficiency when lifting eyebrows (4) and closing eyes (4). Out of the 100 possible points, the initial evaluation achieved 52 points, and at the final score she obtained 92 points.

In the initial evaluation of synkineses, they had a low value, with small synkineses when closing the eyes (1) and wrinkling the nose (1). At the final evaluation, the values were normal and all the synkineses disappeared.

Table no. 2 shows the evolution of the tactile, thermal and pain sensitivity.

In the initial assessment of the tactile sensitivity, the values for the lips (1), the chin (2), the cheek (2), the temporomandibular area (2) and the forehead area (1) showed a deficit of 1 or 2 points.

The initial thermal sensitivity assessment was better, compared to tactile sensitivity. The safe area that scored only 1 point was the cheek, while the chin, lips, temporo-mandibular area and forehead gained 2 points.

Regarding the pain sensitivity, at the initial evaluation, deficiencies were found at the level of the chin, lip, nose and cheek (2). After applying the physical therapy program, all the types of sensitivity obtained the maximum values (3) at the final evaluation.

Following the evolution of the motor activity and muscle tone, the results are presented in table no. 3, where I highlighted the most important aspects.

In the initial evaluation of motor activity, the pyramidal, orbicular muscles of the eyelids and the canine could make a minimal contraction, registering only 1 point out of 3. The other 7 evaluated muscles had a weak contraction, respectively 2 points. At the final evaluation, all muscles obtained the maximum contraction value (3).

The initial assessment of the muscle tone reveals a low tone for front, zygomatic, buccaneer, orbicular muscles of the lips and eyelids (-2), while the corrugating, lateral pyramidal nose muscles, risorius, and mentally lifting muscles had an average tonus (-1). Except for the orbicular muscles of the lips and eyelids, whose tone continued to have an average value (-1), all the muscles evaluated achieved normal values of the muscle tone.

The evolution of the anthropometric measurements is recorded in table no. 5. Fortunately, since the beginning of the recovery program, the facial asymmetry was not significant.

At the initial assessment of the eyebrow and eye distance, a difference of 1 cm was found between the left and right hemifaces, a deficit which was recovered

in the final evaluation. The distance between the zygomatic bone and the lip prick was 1.5 cm in the initial assessment, while in the final assessment was gone. The distance between the nasal fossa and the lip prick was 2.5 cm in the initial evaluation, too large to be fully recovered, so the subject had a 1 cm deficiency at the final evaluation.

The House-Brackmann evaluation scale (Table 4) highlights the evolution of the facial paresis, summarizing all the recorded values and showing the overall evolution of the subject. Thus, at the initial evaluation, out of the 4 possible maximum points, the subject obtained 3, showing an increased level of the facial paresis. After applying the recovery program, the subject scored a 2-point decrease in the final evaluation.

The results we obtained are also confirmed by Ciorba A. et al. (2015), which claim that massage, along with recovery exercises based on the coordination of facial expressions, reduces muscle spasm and facial asymmetry [3].

5. Conclusions

By analyzing the results obtained, we have succeeded in highlighting the most important aspects of the research and we hereby summarizing them.

Through the evaluation tests we have been able to make an objective analysis of the results obtained, highlighting the effectiveness of the applied physical therapy program.

Early intervention through a physical therapy program had beneficial effects on the child with facial paresis, with an improvement in all the evaluated values. The reduction of the facial asymmetries, the recovery of the tactile, thermal and pain sensitivity, as well as the increase of the muscular tone confirms the hypothesis: “It is assumed that the early application of a physical therapy program to a child with facial paresis will lead to the correction of the muscle imbalances and the control of the sensory disorders, following the affection of the facial nerve”.

Being a complex disorder, the approach to the facial paresis must be done interdisciplinary. In this team, the main role is played by parents, together with the specialist doctor and the physical therapist in order to get the best results.

Taking into account that our subject was 6 years of age, it was necessary to monitor the child throughout the intervention, to dose the exercises very carefully, but also to diversify the intervention program so as to motivate the child and facilitate her an active involvement in the therapeutic process.

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