

OCCUPATIONAL THERAPY OF CHILDREN WITH PLEXUS BRACHIALIS PARALYSIS

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Abstract: *The task of occupational therapy for children with plexus brachialis paralysis is to encourage and develop functional abilities for active and independent participation in daily life activities that should be appropriate for their age, needs and wishes. The goal of the research is to show the impact of occupational therapy in the process of training children with brachial plexus paralysis. Subjects and methods The case study was conducted on a sample of 2 subjects (CS1 and CS2) diagnosed with brachial plexus paralysis as a result of childbirth trauma. Subject PS1 has a mild form of damage, aged one and a half months, and subject CS2 has a severe form of damage, aged three months. A developmental approach, a method of structured observation, and an interview with the mother were applied to both respondents. Therapeutic procedures were carried out through an individual program of occupational therapy with elements of the Bobath concept, which included training of the mother in stimulating child care procedures, stimulation of the functional capacities of the affected limb, encouragement and development of the functional abilities needed to perform daily life activities, positioning and making of corrective orthosis. The results showed improvement in both subjects. In the first trimester, CS1 met more expectations than CS2. The stimulation conducted through the positions of CS1 gives a better response than CS2. During positioning itself through all postural positions, CS1 more supported and maintained the physiological position, while CS2 did not maintain the physiological position and pronounced volar flexion of the hand dominated. Both subjects gave an adequate answer and accepted the corrective splint. Conclusion: regardless of age, clinical picture, degree of damage, a holistic approach and continuous work with parents and children with brachial plexus paralysis can help develop the child's functional abilities and optimal functioning in activities of daily life.*

Key words: *plexus brachialis paralysis, occupational therapy, teamwork, activities of daily living.*

Introduction

Brachial plexus injuries are most often peripheral nerve injuries that lead to serious social and financial difficulties, and greatly affect the quality of life. Most often, they occur as mechanical injuries during childbirth. Birth lesions of the plexus brachialis (known in different forms such as Erb's, Klumpke's, Erb-Duchenne's paralysis) make up a very small percentage of birth complications [1]. The incidence of brachial plexus injuries ranges from 1-5 per 1000 births, which depends on the level of development of health care [2,3]. The incidence has remained unchanged since the beginning of this century, despite current technological progress [1]. Predisposing factors for injury to the brachial plexus during childbirth can be neonatal and maternal, or other specific circumstances of the second stage of childbirth that can cause the shoulder to rest behind the symphysis, which can result in injury [4]. The brachial plexus is formed by the roots of the C5-Th1 nerves, and the injury of the brachial plexus belongs to peripheral nerve injuries. Clinically, it can be manifested in the form of paresis, i.e. momentary loss of weakness, or paralysis as a complete loss. Nerve roots are divided into two parts, front and back. The front part innervates the flexor muscles, while the back innervates the extensor muscles. The diagnosis is established by a clinical examination of the child, and various procedures such as electrodiagnostic and radiological procedures and scales of motor and sensory functions can help in the diagnosis [5]. Rehabilitation of neonatal paralysis of the brachial plexus includes conservative treatment, starting as soon as possible with passive movements, sensory stimuli and guidance of the relative's child, instead of surgical treatment, which implies surgical techniques, and is performed only after spontaneous recovery, usually at the age of 3 month [6]. The process of training and recovery is long. In addition to the child, parents, specialist physiatrist, neuropsychiatrist, orthopedist, social worker, speech therapist, defectologist rehabilitator, physiotherapist, occupational therapist, educator, therapist educated for sensory integration training, nurse participate in the process of habilitation and rehabilitation [7-11]. The occupational therapy process includes an assessment that consists of two phases: collecting general data about the child and specific occupational therapy assessments and intervention[12]. The aim of the paper is to present occupational therapy treatment with children with damage to the brachial plexus.

Material and methods

The case study was conducted on a sample of 2 respondents (CS1 and CS2) diagnosed with brachial plexus paralysis, who were included in the habilitation program and treatment in occupational therapy. The research was conducted from 01.07. until 01.10.2021. in the period of hospitalization at the Institute for Physical Medicine and Rehabilitation, "Dr. Miroslav Zotović" Banja Luka (Institute) at the Department for Habilitation and Rehabilitation of Children and Youth with Disturbance of Locomotor Functions. For the purposes of the research, the approval of the institution for conducting the research was obtained, as well as the written consent of the parents for participating in the research. The medical documentation of

the institution was used to collect basic data in the work. The model was applied to both subjects: developmental approach, method of structured observation, interview with the mother. The subjects were included in a comprehensive habilitation treatment. After the initial assessment, they were also included in individual treatment in occupational therapy, after which the final assessment was carried out using the same measuring instruments.

Case study

Presentation 1st Case

Basic anamnestic data

Boy, (C1), aged one and a half months, Dg Paresis pl. Brachialis lat son, P 14, included in habilitation treatment at the Institute through the Day Hospital, due to the weakness of the left arm observed at birth. From the interview with the mother, as well as from the existing documentation, it can be seen that the child from the first controlled pregnancy, delivered at term, ended naturally, PT 4050/56, AS 8/9. Weakness of the left hand was noted at birth. On the recommendation of the physiatrist, the child was referred for habilitation treatment at the Institute. The first habilitation treatment included occupational therapy with the application of the Bobath concept and kinesitherapy with the application of the Vojta technique.

Assessment in occupational therapy

The boy comes to therapy with his mother, mother bring him in her arms. During therapy, occasionally crying, he calms down at his mother's voice. In supination, body asymmetry is present, the head is mostly turned to the left, the left hand is on the base with the fist in volar flexion and flexed fingers. There are no active movements in the segments of the left arm. In the pronated position, the position does not release the left hand, in the Moro reflex, there is no response with the left hand. Pronounced hypotonia of the left arm as a whole.

Training plan and therapeutic goals in occupational therapy

They were aimed at educating the mother (handling, positioning, corrective positions during the child's daily activities). Goals: prevent joint dislocation and fixation of a pathological pattern (posture), acquisition of the appropriate engram in the CNS.

Techniques and activities in occupational therapy

Active and passive methods of occupational therapy, positioning, education of the mother, making a corrective splint. Positioning: Supinated position (we put a diaper under the shoulder for the purpose of correction and symmetry), the arm as a whole is positioned in a physiological position. Positions on the side: on the side of the affected arm (in this case the left one), we turn the child on its side in order to avoid pressure on the affected arm, suggest that the child turns to the side of the affected arm because of the blood flow and that the child also feels the left side of the body. On the healthy side, we turn the child on his full side, on the right side we also practice sensorimotor skills on different surfaces. During this habilitation treatment, the pronated position is performed only by the therapist, stimulation of head lifting as

well as fixation. shoulders. Stimulation of sensorimotor skills through different surfaces, through her own clothes (we advise the mother to wear clothes of different materials), then stimulation of sensorimotor skills through the activity of being fed (education of the mother for the position when feeding the child), stimulation with sound toys, toys of different colors (the goal is to get the middle alignment of the body, i.e. symmetry). Education of the mother during the activity of dressing and undressing (we first dress over the head, then the sick and then the healthy arm, emphasize that we never pull the arm but the sleeve, while the activity of undressing is carried out in the reverse order (the activities of both dressing and undressing should be carried out at shoulder height), education of the mother for the child's bathing activities. Mobilization by segments of the affected hand (maintain a neutral position through the exercises, emphasis on the volar flexion of the hand with abducted fingers), made of cardboard, covered with a bandage, cotton wool covered with a bandage is placed in the hand (semiflexion position of the fingers). In the beginning, it is worn for up to 1 hour, most often while the baby is sleeping, later after the acceptance and adaptation of the child to the splint itself, the period of wearing the splint is extended. Education of the mother in the correct placement of the splint.

Reevaluation

After completing the occupational therapy treatment as part of the habilitation at the Institute, the boy supports keeping his hand in a physiological position, keeps his head in the middle for longer (reduced body asymmetry), adapted to the splint, so the wearing time gradually increases, the mother is trained in therapeutic procedures and daily activities adapted to children age.

Presentation of the 2nd case

Basic anamnestic data

Girl, (C2), aged 3 months, Dg. Neurological risk symptomatology and Paralysis Erb neonati per partum, Fractura claviculae lat sin per partum; Symptomata et signa systematis nervosa et musculosceletels alia. From the interview with the mother as well as from the existing documentation, it can be seen that the child from the first regular pregnancy, PT 3600 gr., PD 53 cm, AS 7. Due to the development of a perinatal infection and the consequences of a traumatic birth (fractura claviculae i. sin pl. brachialis i. son) transferred to et paresis Department of Neonatology. Dual antibiotic therapy was prescribed. On the recommendation of a neonatologist, he was referred to the Institute. The first habilitation treatment started when he was 17 days old, and since then he has been undergoing treatment on several occasions and is under the constant supervision of a physiatrist. The first habilitation treatment includes a program of occupational therapy with the application of the principles of the Bobath concept and kinesitherapy with the application of the Vojta technique.

Assessment in occupational therapy

The girl comes to therapy with her mother. The mother carries her in her arms. During therapy, she is in a good mood, makes contact, smiles, vocalizes. Interested in toys, she follows them with her eyes, but does not reach for tactile stimulation. In a supinated position, stable, head discreetly tilted to the left side. LGE in shoulder joint abduction position, elbow extension, hand in volar flexion position with semiflexed

fingers. Full range of motion is obtained passively. Active movements in the fingers of the left hand (forms a fist), initial movements in the left shoulder. The musculature of the left arm as a whole is hypotonic. During hand traction, the head follows the axis of the trunk with co-contraction in the shoulder girdle. Defenses are missing. When stimulating with toys of different shapes in order to bring the hand to the middle line of the body, as well as reaching with the left hand in order to develop the grip and middle alignment of the body, a minimal response is obtained. He follows the toys with his eyes, partially reaches for them, but lacks grasp (when trying to grasp, the hand remains in volar flexion).

Training plan and therapeutic goals in occupational therapy

They focused on education of the mother, positioning, passive and active methods of occupational therapy, making a new corrective splint for the left arm.

Techniques and activities in occupational therapy

Positioning as before (the arm is positioned in a physiological position), making a new splint made of plastic covered with a thin layer of plastosite, fixed with Velcro, made according to the child's measurements (worn mainly at night, initially up to 1 hour, and later after a period of acceptance and adaptation the time of wearing it is extended). Education of the mother, both for positioning itself and for daily activities adapted to the child's age (activities of dressing, undressing, bathing). During feeding activities, we advise that, if possible, the mother should also introduce supplementary feeding in addition to breastfeeding (the goal is activity and stimulation of holding the bottle), i.e. Stimulation of the hand towards the middle line of the body and the reaching of the hand itself, which is expected at the age of 4 months through the normal psychomotor development of the child. Stimulation with various types of toys, stimulate reaching with toys of bright, bright colors, sound toys, different sizes of balls (the goal is to get the right hand position, i.e. neutral position), hoop toys (formation of a fist in a grip with a separate thumb); keeping the toy at the level of the midline (target midline alignment). Through positions on the side, we stimulate the turning of the child on both sides as a whole. We monitor and stimulate hand switching when turning from one side to the other. On the side of the affected side, we are looking for a medium alignment of the body, to avoid internal rotation of the arm and collapse of the arm under the body. Pronated position: stimulating the head up, then weight transfer on both sides, stimulation of the hand for reaching in the pronated position, as well as sensorimotor stimulation through different surfaces under the arm both in the pronated position and in all other achieved positions. Mobilization by segments of the affected arm (maintain a neutral i.e. physiological position of the arm).

Reevaluation

The girl was given a new corrective splint for her left arm, which she accepted better than the previous one. As a result, the wearing time has also increased, which allows the hand to remain in the physiological position for a longer period of time. Mother trained in therapeutic procedures. After the treatment, the girl reaches for toys more often, manages to keep her hand in the midline of her body when holding the

ball. After sensorimotor stimulation through various surfaces and toys made of different materials, the girl does not show outbursts of sensitivity.

Discussion

In an attempt to explain the treatment results obtained in the occupational therapy of children with damage to the brachial plexus, we should remind that numerous studies are focused on the frequency, manifestations and diagnosis of birth injuries of the brachial plexus immediately after birth [12]. Nevertheless, a significant amount of research is focused on the treatment procedure, prognosis [13-15]. There are numerous methods and therapeutic procedures used in the process of training children with damage to the brachial plexus, but there is no official evidence of which therapy is the most effective in order to achieve a satisfactory level of children's independence and their full active inclusion in the social community. Rarely does therapy rely on just one system, an eclectic approach is common, as it allows for flexibility and individualization to meet the goals set for the child and family. The training plan is created specifically for each child (individual approach). In order to explain the sample of two respondents, the discussion will be conducted through the presentation of mutual similarities between the respondents with regard to the degree of damage to the brachial plexus, the occupational therapy assessment and the results after the occupational therapy treatment. From interviews with the mothers of both respondents (CS1 and CS2), brachial plexus paralysis occurred as a result of childbirth trauma. Both births ended naturally at term. On the recommendation of the physiatrist, both subjects were included in habilitation treatment at the Institute through the Day Hospital until one month after birth (CS1 after one month, and CS2 after 17 days of age). The planned habilitation program included kinesitherapy according to the Vojta method and occupational therapy with the application of the principles of the Bobath concept. Since the patients are of different ages, the goals and expectations after the habilitation treatment are different. Using the principles of the neurodevelopmental approach (NDA), sensory integration (SI), learning specific skills, the intervention is aimed at encouraging the child to use his hands through activities of daily life. During the treatment, special attention was focused on the function of the hand, the development of a fine and rough grip. Play as a child's productivity in therapeutic intervention is used as a medium, and toys as an immense tool for getting to know the child and a successful educational therapy tool. The game and the selection of toys were in accordance with the age of the child, in order to encourage the child and develop functional abilities in all areas of life. Respecting the principles and principles of occupational therapy, the tasks were not too difficult for the child, but they were also designed to increase range of motion, muscle strength, endurance and motor skills. Based on the performed diagnostics, it was determined that CS2 has medium to severe damage, while CR1 has a milder form of damage, and therefore we have different answers when conducting occupational therapy. As indicated by the author Živković (2018), the prognosis of recovery depends on the severity of the lesion and the treatment plan [14]. The led team and after the therapy CS1 met more expectations through habilitation in the first trimester than CR2 in the second trimester. The author

Živković (2018) points out that early stimulation allows muscles to remain flexible and strong, helps reduce or prevent contractures and deformations, stimulates movement and function, which was confirmed in our study with CS1 [14]. CS1 gave a better response than CS2 to early stimulation through positions. Also, during the actual positioning through all positions, CS1 more supported and maintained the physiological position, while CS2 due to the degree of damage itself does not maintain the physiological position (the greatest damage is evident on the wrist where the volar flexion of the hand is pronounced). Both respondents gave an adequate answer and accepted wearing a corrective splint. Corrective hand splints control and prevent extreme ulnar flexion and deviation, while simultaneously controlling thumb adduction [14-19]. Regardless of the age, clinical picture, degree of damage, the education of the mother is one of the most important goals of every treatment so that even after the completion of habilitation at the Institute, the child will have daily treatment in home conditions and so that at the earliest age the procedure of performing daily activities will be easier for the child as well. and for parents [20, 21]. It is crucial to include the child in the habilitation process as early as possible. There is unanimous agreement that early conservative treatment is the main treatment option for rehabilitation of neonatal brachial plexus lesions. Regardless of the type of lesion, clinical development/recovery is expected and therefore it will be easier to make decisions about maintaining conservative treatment or opting for surgical treatment, restarting intensive conservative treatment after surgery [22].

Conclusion

Damage to the brachial plexus is a complex problem that should be approached seriously from the beginning, because this condition has various effects on the function and growth of the upper limbs and requires a comprehensive habilitation program that starts from the first days of the child's life. The correct prognosis of the damage is difficult to set, since it depends on the severity of the damage itself, as well as on many other factors. To the greatest extent, in the entire process of habilitation, the goal, with all included methods, is aimed primarily at reducing the functional deficit that occurs as a result of muscle atrophy and joint contractures, encouraging the development of abilities and skills in accordance with the child's age, increasing and preserving muscle strength and mobility in joints of the shoulder girdle and the entire upper limb. In planning and implementing occupational therapy, the therapy plan must be individual for each child. In order to achieve satisfactory results, mutual cooperation of all team members is required through coordination of therapeutic methods and goal orientation. It is important to emphasize that, regardless of the age, clinical picture, degree of damage, it is of key importance to include the child in the habilitation process and mother's education as early as possible so that even after the habilitation is completed, the child has daily treatment in home conditions and during daily activities adapted to the child's age.

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RADNA TERAPIJA DJECE SA PARALIZOM PLEXUS BRACHIALISA

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Sažetak: *Zadatak radne terapije djece sa paralizom plexus brachijalis je poticanje i razvijanje funkcionalnih sposobnosti za što aktivnije i nezavisnije učestvovanje u svakodnevnim životnim aktivnostima koje trebaju biti primjerene njihovom uzrastu, potrebama i željama. Cilj istraživanja je prikazati uticaj radne terapije u procesu osposobljavanja djece sa paralizom plexus brachijalis. Ispitanici i metode case study je provedena na uzorku od 2 ispitanika (PS1 i PS2) s dijagnozom paralizom plexus brachijalis nastale kao posljedica porođajne traume. Ispitanik PS1 ima lakši oblik oštećenja, starosti mjesec i po, a ispitanik PS2 oštećenje srednje do teškog oblika, starosti tri mjeseca. Kod oba ispitanika primijenjen je razvojni pristup, metod strukturiranog posmatranja, intervju sa majkom. Terapijski postupci su provedeni kroz individualni program radne terapije sa elementima Bobath koncepta koji je obuhvatao obuku majke stimulativnim postupcima brige i njege djeteta, stimulaciju funkcionalnih kapaciteta zahvaćenog ekstremiteta, poticanje i razvijanje funkcionalnih sposobnosti potrebnih za izvođenje svakodnevnih životnih aktivnosti, pozicioniranje i izrada korektivne ortoze. Rezultati su pokazali napredak kod oba ispitanika. PS1 u prvom trimestru je ispunio više od očekivanja, nego PS2. Na stimulaciju sprovedenu kroz položaje PS1 daje bolji odgovor nego PS2. Prilikom samog pozicioniranja kroz sve posturalne položaje PS1 je više podržavao i zadržavao fiziološki položaj, dok PS2 ne zadržava fiziološki položaj i dominira izražena volarna fleksija šake. Oba ispitanika su dala adekvatan odgovor i prihvatanje korektivne udlage. Rezultati ukazuju da, bez obzira na uzrast, kliničku sliku, stepen oštećenja, holističkim pristupom i kontinuiranim radom sa roditeljima i djecom sa paralizom plexus brachialis se može djelovati na razvijanje djetetovih funkcionalnih sposobnosti i optimalnog funkcioniranja u aktivnostima dnevnog života.*

Ključne riječi: *paraliza plexus brachialis, radna terapija, timski rad, aktivnosti svakodnevnog života*