“Functional facilitation” of infants and toddlers with central nervous system damage

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Abstract

The author based on his own long experience defines the term „functional facilitation” in relation to infants and young children with damage to the central nervous system, describes its origins and the importance not only for mastering the future activities of daily living but also for motor development in the field of high- and fine motor skills. Particular attention is paid to the importance of the development of „functional balance” in a sitting position on a chair – as a stepping stone to further functional development, large and small motor skills and to preschool program implementation. Instructing and involving parents in order to maintain the continuous improvement at home increases to a significant degree the chance to progress in the development of children with the central nervous system damage.

Key words: functional facilitation, infants, central nervous system damage

Ryc. 1. Author's substantive experience, related to the discussed issue

During his work in the Institute of Child Health Centre the author of the article coordinated the team which was engaged in the rehabilitation of infants and small children with cerebral palsy. Due to the function performed by him from 1995 to 2010 he attended training courses concerning child physiotherapy in the following rehabilitation centres: Centre for Cerebral Palsy in Bern/Switzerland; International Institute Pető and “Moirá” Centre in Budapest; Hadley Centre for Children in Newcastle/England; Institute Helga Kail in Wien; Course with Sensointegration (S.I.) - Violet Maas from the USA in Warsaw. In the years 1994 – 2004 he performed the function of the President of the Polish Association of Conductive Education (Pető method). In that period he organized 17 courses concerning child rehabilitation in the Institute of Child Health Centre. He organized the I International Learning and Training Conference „Rehabilitation of children with

cerebral palsy” (14th - 15th May 2010) and II International Learning and Training Conference “Conditioning of the effectiveness of rehabilitation of children with cerebral palsy (26th – 28th April 2012). “Functional facilitation” of infants and young children with the central nervous system damage, mainly with cerebral palsy, is aimed at improving the development of mental, emotional and motor activities for future mastery of daily activities [1]. The presence of functional deficits in the fullest extent can be found in children with bilateral hemiplegia form of cerebral palsy (CP). In other spastic forms of CP mastery of functional activity is achieved with a large share of their own child's activity. These forms include bilateral spastic paresis and spastic hemiparesis. The widely accepted classification of spastic cerebral palsies was introduced by Ingram.

Although various authorities in the field of physiotherapy stress the need to achieve functional independence by the child [2], little has been done so far in this specific area of practice.

One possible explanation thereof was proposed by Karel and Berta Bobath (1984) and is still largely valid. Karel and Berta Bobath wrote in their paper: “The last stage of the development of our treatment was the recognition of the fact that the treatment was not carried over activities into activities of daily life, as we had expected it would be”. (Management of the Motor Disorder of Children with cerebral Palsy, 1984, Spastic International Publications) During infancy, the main focus of physiotherapy is to improve movement activity. This is largely justified because it prevents the formation of pathological posture patterns or pathological movement patterns. However, despite using a variety of methods, results are still unsatisfactory.

The conditions of learning and mastering functional activities

Carrying out a physiotherapy program, we should be aware of the fact that conditions for the development of functionality of the normally growing babies are equally important for the development of infants with central nervous system damage.

The conditions of learning and mastering functional activities in the case of infants with normal development are: (1) motivation to perform motor activity; (2) developing of the visual-motor integration; (3) developing purposeful movements (oriented for a specific goal); (4) the parallel development of emotional, mental, motor activity (language, and social development); (5) subordination of motor activity to functional requirements; (6) stages of development of large and small motor skills following each other and mutually interpenetrating.

Ryc. 2. Developing purposeful movements oriented for a specific goal. La Mateye in Physiotherapy Center for Children with CNS injury. Paris. Photo taken by the author.

Mastering the child's functional activities is preceded during infancy by the development of "fine motor skills", i.e. the ability to reach, grasp, release and manipulate objects. Reaching and grasping the object provides new information concerning its

weight, its shape, temperature and the surface texture. This information are very important for the developing brain. While the child acquires these properties in the first months of life, movement runs in close connection with the visual function.

In a 2 month old infant, gaze is focused on objects, "eye catching" and gradual assimilation of the object size, shape, color and most of all movement. Between 4 and 6 months the development of perceptual motor skills can be observed for hands - the first attempts to grasp. It should be noted that earlier, a fully developed prehensile reflex already created the conditions for sensory integration while holding rattles or the mother's fingers. Observation of the infant's own hands, their coming in contact with objects as well as face-to-mother or ality of the grasp; from the monkey grip through the shank and three-point grasp. Improving coordination involves movements not only in the field of view but also outside of it, such as moving objects from hand to hand behind the back or behind the head. Repeating these purposeful movements leads to a complex of sensory - motor integration and with the passage of time to the creation of a sensory motor experience with gradually developing stereognosis.

Frequently repeated by the child purposeful movements lead to complex sensory-motor integration and, with time, the sensory-motor experience - the functional activity which improves along with the performance¹. This process takes time, but is accelerated and expanded. We frequently observe facilitation of the infant, in which the emphasis is on improving motor activity, which does not include, however, the functional activity. Such improvement can be defined "non-functional improvement activity" infants with the central nervous system (CNS) damage.⁵ These actions initiate and promote the natural, normal way of development, that is, from the beginning we are not dealing with the development of motor skills, but with the creation and development of sensorimotor experience.

Otherwise, what we observe in children with bilateral hemiplegia CP during this period a strong increase in spasticity leads to a lack of the sensory-motor integration. As a result, we do not observe the interest of infants function of hands, which completely encloses the baby spontaneous mastery of any action - we can determine the status of "functional amputation of hands."

"Functional Balance" and its importance for the functional development of infants and young children

Development of balance in the sitting position: on the knees, mattress or a ball can be improved with the help of the hands of the physiotherapist, who by changing the ground level releases balance-rotation. While this is correct to a degree, the baby does not acquire functional skills this way (evaluation of the distance from the toy or the ability to maintain balance while reaching) [3]. In the absence of functional sensorimotor experience in this field, despite their motor capabilities, the infant will be afraid of falling.

While, their own activities, infants adapt to the requirements of the environment and are self-overcoming threats to allow for a steady progress in the development of function.

„Functional balance” is the ability to maintain balance by the infant while performing different functional activities

Writing about the functional development of the infant, special attention should be given to the mastery of maintaining the sitting position on a chair. This position plays a key role in controlling the functional efficiency of infant [4].

The importance of „functional balance” in the sitting position on the chair [5,6]

„Functional balance” in the sitting position on the chair, without rails, with the feet flat supported on the floor, results in:

1. Reaching and grasping objects of different levels, and from different directions.
2. Dissociation of upper limbs.
3. Allowing the improvement of the „scissor”, „tweezing” grip.
4. Improved self-service.
5. Improved balance maintaining,
6. Preparing the child for functioning in the school environment.
7. Preparing the child for standing up – shifting body weight to lower limbs, [7,8].
8. Adapting vision function enabling spatial orientation in functional position.

Ryc. 3. Preparing the child for standing up – shifting body weight to lower limbs - evaluation of surface and ground pressure forces by podobarografia. Photo taken by the author

The value of the functional balance

The importance of the functional balance of the chair is connected with the necessity of maintaining her while performing a series of movements required in daily activities - essential while dressing up - mastering tilt of reaching out to shine and unfastening (Velcro tape) or solving the laces. Mastering "functional" balance o seated on a chair, we ought included in program: lifting objects from the floor, reaching to the feet, reaching for object on the side or even part of the back [9].

The effectiveness of the development of the functional balance is closely related to multiple repetition of a particular physical activity, with optimal emotional involvement of the infant.

Baby sitting position on a chair in front of the table ensures a constant distance from the eyes, the development of the eye-hand coordination, orientation in space; allowing you to take great baby manual steps in the midline (midline orientation) as to affect further improvement of balance. These exercises are carried out and controlled by the infant spontaneously. The development of functional balance on a chair in significantly lower limbs

prepares to take on weight maintaining the correct position - knees bend less than 90 degrees while the entire surface of the foot rests on the floor. Baby wanting to grasp the object located on the table further away instinctively leans forward. Placing objects, after which the infant reaches progressively greater distances, allows not only for the functional balance to improve, but also to overcome the abnormal posture and movement patterns.

Common errors leading to the inhibition or arrest the progress of a functional activity are:

1. Too much stress on the gross motor skill development.
2. Not emotional motivation.
3. Insufficient functional integration of the small and gross motor skills with vision function.
4. Lack of development of functional balance in the standing position, and most important, in the sitting position.
5. Insufficient time for developing the functional balance in the physiotherapy practices.
6. Not enough involvement in the functional facilitation process under the physiotherapeutic supervision of the nursery staff.

“Functional activity” for a child with cerebral palsy develop:

- Mastery of small and large motor skills, and their mutual relationship, mastery of functional balance
- functional movement patterns,
- The degree of mastery of certain activities of daily living.

Because of the great importance of these issues on the one hand, and popularizing methods of improvement, on the other hand, it seems necessary to assess the development of functional improvement in these methods.

The presence of parents during facilitation program allows physiotherapists to provide them with guidelines for further development of every day activity [10,11].

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