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THE IMPORTANCE OF EARLY DIAGNOSIS AND EARLY PHYSICAL TREATMENT OF CEREBRAL PALSY

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Summary. *Cerebral palsy (CP) refers to a group of posture and movement disorders occurring as a result of a non-progressive lesion of the developing central nervous system. CP can lead to global dysfunction but always includes motor problems. Early diagnosis of CP is extremely difficult. Often, it is impossible to diagnose CP under the age of four months and even under six months of age in slightly affected children with 'soft neurological signs'. Initially the majority of cerebral-palsied babies do not show definite signs of abnormality, but mainly those of retardation. Treatment should start only when signs of abnormal tonus and movement patterns are seen. In most babies, this happens after a 'silent' period, during which no treatment is necessary, but if suspicious signs develop, treatment must start immediately. In most cases, a very early treatment will give quicker and better results because the baby does not yet show much abnormality and therefore has little experience of abnormal movements. The VOJTA technique has decisive advantages in early physiotherapy of CP. Parents should be regarded as members of the team of therapists.*

Key words: *Cerebral palsy, neuromotor disorders, children, physical therapy*

Cerebral Palsy

Cerebral palsy (CP) is a static encephalopathy caused by an insult to the brain during the prenatal, perinatal, or postnatal period (up to 2 years) (1,2,3). CP can lead to global dysfunction but always includes motor problems (4).

CP has been classified based on the type of motor disorder, with variable numbers and descriptions of types. The revised classification now in use defines the following four main categories of motor disorder (5):

– Spastic (70-80% of cases): quadriplegia (10-15%): all four extremities are affected equally along the trunk; diplegia (30-40%): lower extremities are affected to a greater degree than the upper extremities; hemiplegia (20-30%): involvement is noted in one side of the body, including the arm and the leg; monoplegia (rare): involvement is observed on one limb, either the arm or the leg;

– Dyskinetic or athetoid (10-15% of cases);

– Ataxic (< 5% of cases); and

– Mixed forms (most often spasticity and athetosis, less often ataxia and athetosis).

CP is caused by an insult to the immature brain at any time prior to birth up to 2 years of age. The early central nervous system (CNS) damage results in chronic physical disabilities and often includes sensory impairments. Cerebral insult produces alterations in muscle tone, muscle stretch reflexes, primitive reflexes, and postural reactions. Other associated symptoms may be involved secondary to the neurological insult (mental retardation, speech, hearing and vision problems, perceptual disturbances, epilepsy). 54% of children have more than one associated disability (6).

The etiology of such cerebral insults includes vascular, hypoxic-ischemic, metabolic, infectious, toxic, teratogenic, traumatic, and genetic causes. The pathogenesis of CP involves multifactorial causes, but much is still unknown. Different mechanisms of CP pathogenesis have been associated with pre-term and term births.

The prevalence of congenital CP is approximately 2 per 1,000 births (7).

The Early Recognition of Cerebral Palsy

Early diagnosis of CP is extremely difficult. Often, it is impossible to diagnose CP under the age of four months, and even under six months of age in slightly affected children with 'soft neurological signs'. Initially the majority of cerebral-palsied babies do not show definite signs of abnormality, but mainly those of retardation. In a majority of cases, there is an abnormal birth history such as prematurity, anoxia, asphyxia, hyperbilirubinemia, prolonged or precipitated labour, a small-for-dates baby, twinning, multi-gravid mother, etc. (8). These are the *babies at risk*, who will need a careful follow-up.

Treatment should start only when signs of abnormal tonus and movement patterns are seen. In most babies, this happens after a 'silent' period, during which no

treatment is necessary, but if suspicious signs develop, treatment must start immediately.

First symptoms may appear immediately following, or even during, a stormy perinatal period, but these cases present no particular diagnostic problem. In other instances, there may have been some abnormalities during the pregnancy, followed by a relatively normal perinatal period of varying length, after which symptoms appear. These cases may present diagnostic problems. There is great difficulty in differentiating the pathology from permissible signs of deviation from normal development. There are babies with unusual symptomatology who subsequently develop normally. Because of this, it is very important to repeat examination and assess the baby's rate of development, especially in babies under four months of age (9). In a baby with suspected brain damage, the intervals between seeing the baby should be short, not longer than 3 or 4 weeks after the appearance of suspicious signs. During the first year of the baby's life, the development is at its fastest and 'soft signs' may become 'hard signs' over a very short time.

Early diagnosis rests to a large extent on the differentiation of primitive signs of delay from those of a pathological nature, which in the individual picture may present side by side. Primitive signs can be defined as patterns of activity belonging to very early stages of a normal, full-term baby's postnatal life, signs which were present once, but should have been modified and have disappeared. Pathological signs are motor patterns not seen at any stage of a normal baby's postnatal development.

There is no CP from birth. CP is a consequence of a fixed neurological deficit. It is therefore necessary to screen for future CP before it appears under its definitive form (10). The expression 'central coordination disorder' (CCD) is a transitory situation of the baby during the first year, at the time when the neurological function is already disturbed, when the presence of a CNS lesion could possibly already be verified, but when the evolution is still uncertain. When a lesion to CNS that occurred before, during, or just after the birth risks to induce functional aftereffects, it is during the first months of life that CNS has the best chance to compensate for the functional deficit by developing neuronal replacement circuits due to its great plasticity.

The most useful tests for early diagnosis of CCD include (according to Vojta):

– *Study of postural automatic reactivity*: the tests of global reactions to sudden corporal position changes in the space allow for highlighting every perturbation in the automatic management of the postural mechanisms by the CNS. The progressive transformation of these reactions in the course of the first year of life, in the context of a normal development, is perfectly codified. Their examination enables not only to signal functional anomalies from central origin but also to specify the level of development reached at the moment of the examination.

– *Kinesiologic analysis of the spontaneous motor function*: each stage of a normal development is characterized by behaviors answering to precise finalities (orientation, appropriation, locomotion, etc.). These fundamental needs induce the implementation of locomotor strategies, automatically adapted to the postural context of the moment. The originality of the Vojta methodology is to clearly define the kinesiologic content of these locomotor strategies. Postures, support polygons, movements characterizing the main stages of an optimal development are precisely defined. The distinction between a multitude of individual variants and fundamental postural components is clearly made in order to enable their systematic research in the patient and comparison with possible pathological succedanea.

– *Presence of abnormal reflexes*: A series of reflexes selected in the medical literature, whose modes of provocation, answers and interpretation are precisely described, are used to complete the examination. The presence or absence of these reflexes, their quality, their validity period could be corroborated with different paths of development (spastic, dyskinetic, etc.) (3).

The Early Physical Treatment of Cerebral Palsy – Advantages and Problems

The aim of treatment for children with CP, CCD, or other conditions involving the upper motor neuron of the CNS, regardless of etiology, is to lead them towards the greatest degree of independence possible, and so to prepare them for as normal an adolescent and adult life as can be achieved. This is the aim of all schools of treatment (11).

The treatment of cerebral palsy is directed at repair of the injured brain and at the management of the impairments and disabilities resulting from developmental brain injury. Currently, there are no clinically meaningful interventions that can successfully repair the existing damage to the brain areas that control muscle coordination and movement. Management options include physiotherapy, occupational and speech therapy, orthotics, device-assisted modalities, pharmacological intervention, and orthopedic and neurosurgical procedures (12).

It involves establishing a total management programme for the child in which a specialized physiotherapy forms an essential part (13).

There are a lot of techniques of treatment: Vojta method (3); Bobath method (2); Conductive education-Peto (14); Integrated therapy (15); Music therapy (16); TAMO - Tscharnuter Akademie for Movement Organization (17); Constraint-induced movement therapy (18, 19); Sensory integration (20); Strength training (21); Hippotherapy (22); etc.

No technique can cure CP, even if the child is treated very early, and no technique can change all cases to only 'minimal CP'. However, if treatment starts before the abnormal patterns of movement have been established ('CCD level'), it can help the child organize his potential abilities in what is for him the most normal way.

No technique is suitable for all children. A systematic and adequate treatment plan requires a thorough assessment of each child. Otherwise, valuable time can be lost by doing things which are unimportant and not dealing with the main problems (23).

There are many reasons why CP or CCD children benefit more from early treatment than from treatment given at later age. Early treatment, at around 1 to 4 months of age, is important because of the great adaptability and plasticity of the infantile brain. During the first 18 months of a child's life, there is great and speedy development, and at no other stage of growth does the child learn so quickly (2,24). It is a time when the potential in not only highest for learning but also for adjustment to CCD or CP.

In most cases, a very early treatment will give quicker and better results because the baby does not yet show much abnormality and therefore has little experience of abnormal movements ('CCD level'). Furthermore, because treatment and handling are easier for the mother and therapist, the mother can more easily be instructed and trained in the best way of how to handle her baby. Her involvement in management and treatment helps in establishing a good mother-child relationship and also gives her support and encouragement. It helps to prevent over-protection, as well as rejection. Training and guiding the mother or both parents in home management is of the greatest importance. Parents should be regarded as members of the team of therapists, since the child is actually with therapist for only a limited time and spends most of his time at home.

A problem with a very early treatment is that often it is impossible to diagnose CP under the age of four months and even under six months of age in slightly affected cases with 'soft neurological signs'. Initially the majority of CP babies do not show definite signs of abnormality, but mainly those of retardation (2).

Despite the difficulty of very early diagnosis, many at-risk babies are 'preventively treated and cured'. The difficulty in making an early diagnosis and assessing the results of early treatment is born out by statistical evaluation of Vaclav Vojta. He states that out of 207 babies diagnosed and treated between one week and four months of age, 199 (96%) were discharged with normal motor and mental activity. It is possible that about half of these babies diagnosed as 'symptomatic babies at risk' may have been treated unnecessarily (3).

The Vojta Concept

The VOJTA technique presents decisive advantages in early physiotherapy of CCD and CP. It can be used from the first days of life for preventive or curative purposes. The treatment based on the reflex locomotion (reflex creeping and reflex rolling) contributes to (3):

– Modification of the reflex activity of the young child and orientation of the neuromotor development in a more physiological direction, by induction of a different central neurological activity that supplies to the patient a new corporal perception. The muscular proprioception plays a very important part.

– Modification of the spinal automatisms in lesion to the spinal cord;

– Control of breathing in order to increase the vital capacity; and

– Control of the neuro-vegetative reactions and promotion of a harmonious growth of the locomotor anatomical system.

Reflex locomotion patterns (reflex creeping and reflex rolling) are global. During these activities, the totality of the musculature is activated according to a coordinate mode. The different levels of the CNS are concerned by this activation. The reflex locomotion is provoked by specific stimulations (pressures) applied to defined zones.

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ZNAČAJ RANE DIJAGNOZE I RANOG FIZIKALNOG TRETMANA CEREBRALNE PARALIZE

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Kratak sadržaj: *Cerabralna paraliza (CP) obuhvata poremećaje položaja i pokreta koji su posledica ne-progresivne lezije centralnog nervnog sistema u razvojnom periodu. CP izaziva opštu telesnu disfunkciju sa dominantno motornim smetnjama. Veliki je problem postaviti dijagnozu CP u prva četiri meseca života deteta. Ukoliko se radi o vrlo diskretnim oblicima sa minimalnom neurološkom simptomatologijom, dijagnozu je moguće postaviti tek nakon šestog meseca života. U najvećem broju slučajeva CP, u prvim mesecima deca ne pokazuju znake definitivnog motornog deficita, već znake motornog kašnjenja. Tretman treba započeti odmah nakon uočavanja ovih 'tihih' znakova (izmene mišićnog tonusa, abnormalna shema pokreta), jer su tada šanse za oporavak najveće. U najvećem broju slučajeva rani tretman daje najbolje rezultate i treba ga započeti dok još nije došlo do definitivne fiksacije patološke motorne sheme. Jedna od najboljih tehnika ranog fizikalnog tretmana je VOJTINA tehnika. Roditelji su najvažniji i neizostavni članovi terapeutskog tima.*

Ključne reči: *Cerebralna paraliza, neuromotorne smetnje, deca, fizikalna terapija*